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ENGLISH BOTANY.

ENGLISH BOTANY;

OR,

COLOURED FIGURES

OF

BRITISH PLANTS.

EDITED BY JOHN T. BOSWELL, LL.D., F.L.S., ETC.

THE POPULAR PORTION BY MRS. LANKESTER.

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"WILD FLOWERS WORTH NOTICE," ETC. ETC.

Third Edition,

ENLARGED, RE-ARRANGED ACCORDING TO THE NATURAL ORDERS,
AND ENTIRELY REVISED.

WITH DESCRIPTIONS OF ALL THE SPECIES BY THE EDITOR

VOLUME VIII.

CHENOPODIACEÆ TO CONIFERÆ.

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ENGLISH BOTANY.

ORDER LXI.—**C H E N O P O D I A C E Æ.**

ANNUAL or perennial herbs or undershrubs, with the leaves alternate or opposite, often fleshy, and not unfrequently mealy, without stipules. Flowers perfect or unisexual (monœcious or polygamous), without scarious bracteoles, and generally without herbaceous ones, arranged in heads, spikes, or glomerules; perianth single. Calyx herbaceous, of 3, 4, or 5 sepals, generally more or less united in the female flowers, sometimes of 2 sepals, which increase in size after flowering; æstivation imbricated, except where there are only 2 sepals. Stamens usually as many as the divisions of the perigone, and opposite to them, rarely fewer, hypogynous, or situated on a perigynous disk. Ovary solitary, free from or rarely adhering at the base to the perianth; 1-celled and 1-ovuled; ovule amphitropous. Stigmas 3 or 4, free, filiform, sessile, or with more or less distinct styles, which are sometimes united. Fruit a utricle, enclosed in the calyx, indehiscent or bursting irregularly, or rarely splitting circumcissily or berry-like. Seed 1; embryo rolled round farinaceous albumen or spirally twisted or rolled up like a snail-shell, and destitute of albumen.

TRIBE I.—**S A L S O L E Æ.**

Flowers all alike, and commonly all perfect. Seeds exalbuminous or nearly so; embryo spirally rolled up, herbaceous.

Stems continuous, leafy. Leaves subcylindrical, fleshy.

GENUS I.—**S U Æ D A.** *Forsk.*

Flowers perfect or more rarely polygamous. Calyx free from the ovary, of 5 sepals, without dorsal wings or appendages. Stamens 5; filaments filiform, free. Styles 3, rarely 4 or 5, stigmatiferous

throughout. Fruit membranous, enveloped in the connivent fleshy or rarely scarious sepals of the calyx, which have no wings. Seed horizontal or vertical, lenticular; testa double, the outer layer crustaceous; albumen none, or in small quantity; embryo coiled in a spiral.

Herbs or undershrubs with semicylindrical leaves and small sessile axillary flowers.

The derivation of the generic name is obscure.

SECTION I.—EU-SUÆDA. *Gren.* and *Godr.*

Seed vertical, laterally compressed.

SPECIES I.—**SUÆDA FRUTICOSA.** *Forsk.*

PLATE MCLXXVIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 3194.

Schoberia fruticosa, *C. A. Meyer*; *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 692.

Salsola fruticosa, *Linn.* Sp. Plant, ed. ii. p. 324. *Sm.* Engl. Bot. No. 635.

Chenopodium fruticosum, *Linn.* Sp. Pl. ed. i. p. 221.

Stem woody, perennial, erect, much branched; branches erect or ascending, glabrous. Leaves subcylindrical, abruptly contracted at the base and apex, obtuse. Flowers axillary, sessile, solitary or 2 or 3 together. Styles 3. Seeds vertical, shining, smooth.

On sandy and shingly sea coasts. Rare and local. On the Chisel Bank, and at Poole Harbour, Dorset; near Malden and Harwich, and below Wivenhoe, and other places in the east of Essex; Walberswick, near the ferry, and Southwold, Suffolk; rather common on the north coast of Norfolk. Naturalised on the ballast hills at the mouth of the Tyne and Tees. It has also been reported from the counties of Cornwall and Devon, and from the island of Steep Holmes on the Severn; but probably a large form of the next species has been mistaken for it.

England. Shrub. Late Summer, Autumn.

Root with numerous very long, very nearly simple fibres. Stem much branched, very hard, and wood often as thick as a man's finger at the base, 1 to 3 feet high. Leaves spreading, crowded, $\frac{1}{4}$ to $\frac{5}{8}$ inch long, semicylindrical, slightly convex above, convex beneath, abruptly contracted at the apex, very fleshy, sprinkled with minute whitish points. Flowers about the size of sago grains, yellowish green, arranged in leafy spikes towards the apex of the branches, each flower with 3 minute ovate scarious bracts at the base; perianth 5-partite. Seed

lenticular, shining black, with a thin membranous pericarp, the margin slightly keeled and produced into a point towards the hilum. Plant slightly glaucous, the young branches reddish.

Shrubby Scablite.

French, *Suêda ligneuse*.

This plant is also known as Shrubby Saltwort and Glasswort. It is one of the plants burned in southern Europe for the manufacture of barilla.

SECTION II.—CHENOPODINA. *Moq.-Tand.*

Seed horizontal, compressed from above.

SPECIES II.—**SUÆDA MARITIMA.** *Dumort.*

PLATE MCLXXIX.

Billot, Fl. Gall. et Germ. Exsicc. No. 1057.

Schoberia maritima, *C. A. Meyer*; *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 692.

Chenopodina maritima, *Moq.-Tand.* in *D.C. Prod.* Vol. XIII. Part II. p. 161.

Chenopodium maritimum, *Linn. Sm. Engl. Bot.* No. 633.

Stem more or less woody, annual, erect or procumbent, generally much branched, branches ascending. Leaves semicylindrical, not contracted at the base, tapering towards the apex and rather acute. Flowers axillary, 2 or 3 together, more rarely solitary or 4 or 5 together. Styles 2. Seeds horizontal, shining, very faintly striate.

Var. *α*, *ascendens*.

Stems ascending or erect.

Var. *β*, *procumbens*.

Stems procumbent or prostrate.

On salt marshes and places occasionally overflowed by the sea. Common, and generally distributed throughout the kingdom.

England, Scotland, Ireland. Annual. Summer, Autumn.

Root annual. Stem tough and somewhat woody, especially towards the base, but much less so than in the last species, and not surviving the winter. The size varies from a few inches to 2 feet or more, and the branching, and also the direction of the branches, is very variable. Leaves $\frac{1}{4}$ to $1\frac{1}{2}$ inch long, flat or slightly channeled on the upper side, semicylindrical below, very fleshy, more tapering towards the apex, and less contracted at the base than in *S. fruticosa*. Flowers usually more numerous in each glomerule, so that the spikes are more conspicuous than in the last species, and the seed lies horizontally across the perianth; that is, it is compressed horizontally and not laterally;

it is very similar in size and shape to that of *S. fruticosa*, but more distinctly beaked, and very faintly marked with short striæ, and the colour is rather pitchy than black. Plant pale glaucous green, often turning red or purple towards the close of the year. The erect variety is more common in the south, the procumbent in the north; but it is scarcely possible to draw any line of demarcation between them.

Annual Seablite.

French, *Suëda maritime*. German, *Meerstrands Gänsefüsschen*.

GENUS II.—**SALSOLA**. *Linn. Gärt.*

Flowers all perfect. Calyx free from the ovary, of 5 sepals (very rarely 4), on the back of each of which a transverse dorsal wing is developed after flowering. Stamens 5, rarely 3; filaments linear, often dilated and united at the base. Styles 2 or 3, often united at the base. Fruit membranous, rarely slightly fleshy, enveloped in the calyx, which has 5 membranous wings spreading like a star. Seed horizontal, subglobose; testa single, membranous; albumen none; embryo green, coiled in a spiral.

Herbs with semicylindrical fleshy leaves, generally recurved and prickly at the apex. Flowers axillary, sessile.

The name of this genus of plants is derived from the Latin words *sal*, salt, and *solus*, alone, from its saline qualities.

SPECIES I.—**SALSOLA KALI**. *Linn.*

PLATE MCLXXX.

Billot, Fl. Gall. et Germ. Exsicc. No. 841.

Stem diffusely branched, procumbent or ascending; branches not articulated. Leaves alternate, sessile, subcylindrical, attenuated into subulate spinous points, very fleshy. Flowers solitary or 2 or 3 together in the axils of the leaves, arranged in spikes at the termination of the branches, which are usually so disposed as to form a panicle. Bracts lanceolate, with subulate spinous points. Segments of the fruit perianth generally with a large scarious transverse wing on the back, or more rarely with the wing minute. Plant (in the form which occurs in Britain) with the stem and margins of the leaves clothed with cartilaginous spreading hairs.

On sandy seashores. Common, and generally distributed.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Root wiry. Stem much branched, especially from the base, generally

3 inches to 1 foot long, marked with narrow pale stripes on a green ground; sometimes nearly erect, and 18 inches to 2 feet high, with flexuous branches. Leaves numerous, $\frac{1}{2}$ to $1\frac{1}{2}$ inch long, slightly recurved, dilated and membranous at the base, but not clasping more than one-third of the stem, the tips terminating in a stiff short spine; upper leaves shorter and broader. Each flower with 2 bracts resembling the leaf in the axil of which it is situated, but rather shorter. Perianth segments at first erect, lanceolate, scarious, becoming enlarged and cartilaginous and connivent in fruit, when it is furnished about the middle with a transverse scarious wing spreading horizontally and varying much in breadth. Stamens 5; anthers pale yellow. Style 2- or 3-cleft, with the branches stigmatiferous. Fruit depressed-turbinate, crowned by the base of the style, and concealed by the connivent perianth segments. Seed horizontal, with a brown membranous testa which adheres to the thin pericarp; embryo green. Plant green, slightly glaucous, succulent, more or less hairy in all the British specimens I have seen.

Prickly Saltwort.

French, *Soude épineuse*. German, *Gemeines Salzkraut*.

This plant was at one time highly valued on account of the quantity of soda it contains, and was collected on the seashore, and burned for the use of soap manufacturers. The ashes are known by the name of barilla. Less cumbrous methods of obtaining soda are now more frequently employed.

TRIBE II.—SALICORNEÆ.

Flowers all alike, and commonly all perfect. Seeds sparingly albuminous; embryo variously placed, conduplicate.

Herbs with jointed stems, leafless, or with fleshy leaves. Flowers in spikes, buried in excavations of the rachis, or in the axils of the leaves.

GENUS III.—SALICORNIA. *Tournef.*

Flowers perfect or polygamous, buried in excavations in the axis, 3 arranged in a triangle on each side at the base of the internodes. Calyx free from the ovary, fleshy, compressed, truncate or 3 to 4-toothed at the apex. Stamens 1 or 2. Styles 2, included in the perianth. Fruit compressed, membranous, enveloped in the closed calyx, which is wingless, or with a faint transverse wing at the top. Seed vertical, with a single membranous testa or a double one of which the outer layer is crustaceous; embryo variously placed with respect to the albumen.

Leafless herbs or undershrubs with jointed succulent stems. Spikes thickened in fruit.

The name of this genus of plants is derived from the words *sal*, salt, and *cornu*, a horn, from its nature and the shape of its stems.

SPECIES I.—**SALICORNIA HERBACEA.** *Linn.*

PLATES MCLXXXI. MCLXXXII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1317.

Root annual. Stem not rooting; branches opposite, usually again conspicuously branched; internodes of the stem and branches thickened upwards, and slightly compressed. Spikes terete in flower, cylindrical in fruit. Flowers in threes, immersed in the fleshy spike towards the base on each side of each internode, the 3 flowers arranged nearly in an equilateral triangle. Perianth slightly winged along the cleft in fruit. Seed with an herbaceous hairy testa. Plant green, or, more rarely, tinged with dull red or yellowish brown.

Var. *α*, *acetaria*. *Moq.-Tand.*

PLATE MCLXXXI.

S. annua, *Sm.* Engl. Bot. No. 415.

Stem erect, branched; branches suberect.

Var. *β*, *procumbens*.

PLATE MCLXXXII.

S. procumbens, *Sm.* Engl. Bot. No. 2475.

Stem procumbent or decumbent. Branches spreading or procumbent.

On muddy salt marshes, especially by the sides of tidal rivers. Rather common, and generally distributed. Vars. *α* and *β* about equally common.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem and branches 4 inches to 2 feet high in var. *α*, rarely more than 6 or 8 inches in var. *β*, with a central woody core covered with a smooth translucent herbaceous flesh, which is divided by joints at the nodes, the upper part of each internode larger than and embracing the base of the one next above it; branches very variable in length. Spikes formed of short fleshy internodes resembling those of the stem, each with 3 flowers on each of the two opposite sides: the succeeding internode with its flowers over the spaces between the two triangles of flowers. Stamens 1 or 2; anthers pale yellow. Seed greenish white, ovoid, hairy with curved hairs, enclosed in the calyx. Flesh drying up towards the bottom of the stem when the plant is in flower, so that it is merely covered by a dry greyish skin, and by the time the plant is in seed the fleshy portion is nearly all eroded except on the spikes, which become of a pale dirty yellow.

The extremes of varieties α and β are very unlike in habit, but it is impossible to draw any distinct line between them.

Common Marsh Samphire.

French, *Salicorne herbacée*. German, *Krautartiges Glasschmalz*.

This plant was formerly collected in large quantities from the muddy flats near the coast, where it generally grows, and burnt for barilla; being first dried in the sun, and then made up into small heaps over holes, which received the soda ash, in a melted state, as it ran from the burning masses. With many other plants of the order it is still used for this purpose in the countries around the Mediterranean; but since the introduction of Le Blanc's process for obtaining soda from common salt, the importance of barilla as an article of commerce has much diminished. It is also used as a pickle, and has somewhat the flavour of the Rock-samphire.

SPECIES II.—**SALICORNIA RADICANS.** *Sm.*

PLATE MCLXXXIII.

S. herbacea, var. *Benth.* Handbk. Brit. Fl. ed. ii. p. 386.

S. fruticosa, *Sm.* Engl. Bot. ed. i. No. 2467 (non *Lin.*).

Root perennial. Stem woody, procumbent, sending up erect herbaceous branches, which are usually simple, or with short secondary branches; internodes of the branches subcylindrical, scarcely thickened upwards, slightly compressed. Spikes cylindrical in flower, fusiform- or clavate-cylindrical in fruit. Flowers in threes, immersed in the fleshy spike towards the base on each side of each internode, the 3 flowers arranged in an obtuse-angled triangle. Seed with an herbaceous hairy testa. Perianth slightly winged along the cleft in fruit. Plant olive green, usually tinged with fawn colour.

In muddy and shingly salt marshes by tidal rivers. Local, and confined to the south-east of England. In Dorset, Hants, Sussex, Kent, Essex, and Norfolk.

England. Shrub. Autumn.

Stem woody, procumbent, from the thickness of a crow-quill to that of a man's little finger, and 6 inches to 2 feet long, sending up very numerous rather slender branches furnished with short lateral branchlets, or nearly entire. In other respects this plant comes very near *S. herbacea*, but the two grow together, so the difference cannot be the effect of situation; and it is certainly not from luxuriance, as suggested by Mr. Bentham, as the first year's plants of *S. radicans* are considerably smaller, or at least with the branches much more slender, than in *S. herbacea* of the same age. *S. radicans*, however, never flowers the first season, and in the second it does not commence flowering till nearly a month after *S. herbacea*. The spikes are generally shorter and considerably thicker towards the apex, and the plant

is more tinged with reddish fawn colour, often growing in enormous tufts which are conspicuous from a distance. This is particularly observable near Whitstable, where this plant forms nearly the sole vegetation which borders low water-mark.

I am unable to see any difference between the seeds of this and *S. herbacea*, so that Moquin-Tandon is clearly mistaken in referring it to his *Arthrocnemum fruticosum*, the seeds of which have a crustaceous testa: Grenier and Godron have fallen into a similar mistake, so that probably Smith's plant is very rare or unknown on the Continent.

Creeping Marsh Samphire.

French, *Salicorne radicante*.

TRIBE III.—CHENOPODIEÆ.

Flowers all alike, and commonly all perfect. Seeds copiously albuminous; embryo curved round the outside of the albumen.

Stem continuous, leafy. Flowers not buried in excavations of the rachis.

GENUS IV.—**BETA**. *Tournef.*

Flowers perfect. Calyx with the tube adhering to the ovary at the base, angular; limb 5-partite. Stamens 5, inserted on a fleshy disk which unites the calyx and ovary. Styles short, 2 to 3, rarely 4 or 5. Fruit depressed, adherent to the calyx, the tube of which is enlarged and becomes woody in fruit. Seeds horizontal; testa membranous; albumen mealy; embryo peripheral, enclosing the albumen.

Herbs with alternate, undulated, often fleshy leaves; and flowers in axillary glomerules arranged in long terminal spikes, often grouped into panicles.

The name of this genus of plants comes from *Bætis*, a river of Andalusia, in which it grew; or, as Dr. Mayne says, from the letter β , which the seed-vessel is said to resemble.

SPECIES I.—**BETA MARITIMA**. *Linm.*

PLATE MCLXXXIV.

Billot, Fl. Gall. et Germ. Exsicc. No. 3191.

B. vulgaris, β . *maritima*, *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Part II. p. 56.

Perennial. Root rather thick, tapering, somewhat fleshy, many-headed. Stems numerous, almost always decumbent. Radical leaves on long stalks, rhomboidal-ovate or rhomboidal; lower stem leaves on short stalks, similar to the radical leaves, the upper ones becoming narrower, until the uppermost are narrowly rhomboidal-lanceolate.

Glomerules with 2 or 3 (rarely 1 or 4) sessile flowers in the axil of strapshaped acuminate foliaceous bracts, arranged in long lax spikes at the apex of the stems and branches. Segments of the perianth incurved in fruit, and with blunt entire keels. Styles 2 or 3.

By the banks of brackish ditches, and on waste ground, cliffs, and shingle by the sea. Rather common, and generally distributed in England. Rare in Scotland; it is said to be found in Orkney and in Shetland, but I have seen no Scotch specimens north of the shores of the Firth of Forth. Generally distributed in Ireland, but rather rare in the north.

England, Scotland, Ireland. Perennial. Late Summer, Autumn.

Root rarely thicker than a man's thumb, passing insensibly into a many-headed rootstock which produces barren tufts and stems which spread in a circle. Stems angular, generally with only the terminal portion ascending. Radical leaves insensibly attenuated into long petioles, the lamina and petiole together 3 inches to 1 foot or more long, margins repand and somewhat undulated, with a prominent angle in the lower half of the lamina; stem leaves much smaller, the lowest, including the petiole, rarely more than 3 or 4 inches, the upper 1 inch or less; all of them more or less fleshy. Spikes 3 inches to 1 foot long, generally combined into a panicle, or simple on weak plants. Bracts much longer than the glomerules. Flowers yellowish green. Perianth with the edges of the boatshaped segments scarious. Anthers yellow. Styles generally 2, slender. Base of the perianth enlarged and becoming corky in fruit; calyx falling off when the fruit is ripe; the calyces in each glomerule cohering, but generally only 1 or 2 fruits in each glomerule are perfected. Leaves shining, deep green, glabrous, fleshy; stem with green stripes.

Sea Beet.

French, *Bette maritime*. German, *Meerstrands Runkelrübe*.

This plant is closely allied to the cultivated beet and mangold-wurzel, which are varieties of a species found wild in the countries of the Mediterranean. If we examine the wild plant, we find some specimens in which the roots and foliage are highly tintured with a purple colour, whilst others incline to yellowish-green hue. These two varieties are the initiatives of the red and the white beet, and also of the red, white, and orange mangold-wurzel. The wild, or Sea Beet, has a woody root of no value as food for man or cattle; though from the great changes possible by cultivation, it seems not improbable that the present plant might be made to furnish soft fleshy roots by long and careful culture, were it worth while to make the experiment. The leaves form an excellent green vegetable, closely resembling spinach in flavour, but much better, while the plant is equally productive, and, being perennial, more easily cultivated. It should be planted in rich soil, and the leaves gathered in succession as they grow: by cutting down the flowering stems a crop may be obtained till late in the autumn. The Beet may be propagated either by division of the crown

of the root or by seed: the latter is the most convenient plan; the fruit generally ripening in great abundance. It is abundant on the southern coast on a chalky soil: in the garden it will grow almost anywhere. In Ireland the leaves are often collected and eaten as food, but little use is made of the plant on our own shores.

GENUS V.—**CHENOPODIUM.** *Linn.*

Flowers perfect, or rarely polygamous. Calyx free from the ovary, of 5, more rarely of 3 or 4, sepals slightly united at the base. Stamens 5, or fewer by abortion, inserted at the base of the calyx. Styles 2, more rarely 3, often united at the base. Fruit membranous, enveloped in the connivent calyx segments, which do not alter in fruit. Seed horizontal or more rarely vertical, lenticular, with a crustaceous testa; albumen farinaceous; embryo peripheral.

Herbs of various habit, the leaves generally alternate, ovate or rhombic or triangular-rhombic. Flowers in glomerules collected into spikes, which are commonly arranged in panicles.

The name of this genus of plants comes from the Greek words *χῆν*, a goose, and *πῶς*, a foot, from its supposed resemblance.

SECTION I.—**EU-CHENOPODIUM.** *Gren. and Godr.*

All the flowers 5-merous. Seeds all horizontal.

SPECIES I.—**CHENOPODIUM POLYSPERMUM.** *Linn.*

PLATES MCLXXXV. MCLXXXVI.

Stem decumbent or erect, much branched. Leaves ovate or oval, entire, or rarely with a single lateral tooth on each side near the base, obtuse or acute. Flowers in minute glomerules or solitary, arranged in lax ascending-erect terminal and lateral spikes, or small spreading axillary forked cymes; the former leafy towards the base, the latter leafless; spikes or cymes combined into long lax slender terminal panicles, which are leafy except the apex. Fruit calyx with the segments not keeled, not nearly covering the fruit. Seeds all horizontal, minute, shining,* roughened with small points. Plant destitute of white meal.

* In examining the seeds of this genus, the tyro must be careful to rub off the investing pericarp, which gives a dim appearance to the seeds, even when they are really shining.

Var. α , *genuinum*.

PLATE MCLXXXV.

C. polyspermum, *Sm.* Engl. Bot. No. 1480. *Linn.* Herb. (!).“*C. cymosum*, *Cheval*, Pl. Par. Vol. III. p. 385.”*C. polyspermum*, var. *cymosum*, *Mog.-Tandl.* in *D.C.* Prod. Vol. XIII. Pt. II. 62.

Stems decumbent. Leaves generally obtuse. Flowers in axillary compound leafless dichotomous cymes with divaricate branches; cymes are shorter than the leaves from which they spring.

Var. β , *acutifolium*.

PLATE MCLXXXVI.

Billot, Fl. Gall. et Germ. Exsicc. No. 1318.*C. acutifolium*, *Sm.* Engl. Bot. No. 1481.*C. polyspermum*, var. *spicatum*, *Mog.-Tandl.* in *D.C.* Prod. Vol. XIII. Pt. II. p. 62.

Stems erect or ascending. Leaves acute, the upper ones narrowly lanceolate-elliptical. Flowers in erect spikes in the axils of the leaves and at the apex of the branches, the lower spikes equalling or exceeding the leaves; all of them composed, towards the base, of small simple cymes in the axils of minute leaves, and of sessile glomerules without the leaves towards the apex.

In rich cultivated ground and waste places, especially where the ground has been recently turned up, and on old manure heaps. Rather rare, but generally distributed over the south of England; extending north to the counties of Notts, Derby, and Chester or South Lancashire; also on the ballast hills at the mouth of the Tyne. In Ireland it has been found near Dublin and Cork, but believed to be casually introduced. Var. β , according to the general account, is the more common form, but about London I have more frequently found var. α .

England, [Ireland.] Annual. Late Summer, Autumn.

Stems 3 inches to 3 feet long in var. α , 3 to 18 inches high in var. β , angular, often striped with green and red. Leaves rather shortly stalked, the lamina of the largest $\frac{3}{4}$ to 2 inches long, variable in breadth and in the shape of the apex, which is sometimes retuse with a small apiculus, sometimes rounded and apiculate, and sometimes acute. Flowers very minute, very numerous, green; in var. α , in evident cymes; but in var. β these cymes are usually only once forked, the upper ones with the lateral branches so short that they are reduced to glomerules: but, according to the observations of Professor Babington, and the Rev. W. A. Leighton, and others, the examination of numerous

specimens shows that the two cannot be separated. If, indeed, we conceive the axillary spikes of var. β greatly developed, they would put on exactly the appearance of the branches of var. α . Seeds reddish-brown, globular, subreniform, depressed, rather smaller than maw-seed (*Papaver hortense*), black or reddish-black, closely invested by the pericarp. Plant green or tinged with red.

Many-seeded Goosefoot.

French, *Ansérine polysperme*. German, *Vielsamiger Gänsefuss*.

This plant is also known as Allseed, Goosefoot, or Blite.

SPECIES II.—**CHENOPODIUM VULVARIA.** *Linn.*

PLATE MCLXXXVII.

Billot, Fl. Gall. et Germ. Exsicc. No. 2354.

C. olidum, *Curt. Sm.* Engl. Bot. No. 1034. et *Auct. Ang. Plur.*

C. foetidum, *Lam.* Fl. Fr. Vol. III. p. 244 (non *Schrad.*).

Stem decumbent, diffusely branched; branches divaricate. Leaves rhombic- or deltoid-ovate, entire. Flowers in minute glomerules, arranged in short dense erect terminal and axillary spikes, destitute of leaves; spikes combined into short compact terminal panicles, leafy only at the base. Fruit calyx with the segments not keeled, covering the fruit. Seeds all horizontal, rather small, shining, finely punctured. Stem, leaves, and calyx sparingly clothed with white meal, most abundant when the plant is young.

By roadsides, especially at the foot of walls, and in waste places, chiefly in the neighbourhood of towns or villages, or by the sea. Rather common, and generally distributed in England, except in the west, but becoming scarce in the north. Very rare in Scotland, where it appears to be confined to the coast from Fisherrow to Prestonpans, the former in Mid-Lothian, the latter in East Lothian; it has also occurred on the ballast hills on the Fife coast, but doubtless introduced there. Very rare, and possibly now extinct in Ireland, although it has occurred near Cork, Tramore, Dublin, and Belfast.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stems weak, slender, wiry, branched throughout, branches mostly opposite, spreading in all directions, 3 to 18 inches long, often ascending at the extremity, the lower ones as long as the principal stem. Largest leaves $\frac{1}{2}$ to $1\frac{1}{4}$ inch long, and generally nearly as broad, on stalks of about their own length; the upper leaves decreasing in size, but not to any great extent. Spikes $\frac{1}{4}$ to $\frac{1}{2}$ inch long, continuous or slightly interrupted, the lateral ones shorter than the leaves from the axil of which they spring, collected into small panicles at the apex of the stem and branches. Fruit globular-reniform, depressed,

pitchy black, closely invested by the pericarp, about the size of a mignonette seed. Plant greyish green, more or less thickly sprinkled with white meal, especially when young, intensely fœtid; stem concolorous.

This is the only indigenous British *Chenopodium* which has any perceptible odour, and, so far as I know, the only one of the genus which is decidedly fœtid, except the Russian *C. fœtidum*.

Stinking Goosefoot.

French, *Anserine fétide*. German, *Stinkender Gänsefuss*.

SPECIES III.—CHENOPODIUM ALBUM. *Auct.*

PLATES MCLXXXVIII. MCLXXXIX. MCXC.

C. leiospermum, *D.C. Fl. Fr. Vol. III. p. 390.*

Stem erect, more or less branched, the branches erect ascending. Leaves rhombic or ovate- or lanceolate-rhombic, wedgeshaped at the base, irregularly toothed; the upper ones narrower, attenuated at each end. Flowers in moderately large glomerules, arranged in short dense erect simple or slightly compound leafless spikes; spikes arranged in slender leafy terminal panicles: or the glomerules in elongate lax compound spreading terminal and lateral spikes, leafy towards the base, or in small cymes, sparingly leafy towards the base; the spikes or cymes combined into a lax leafy panicle. Calyx segments keeled on the back, covering the fruit, with narrow scarious margins. Seeds all horizontal, rather small, shining, nearly smooth, bluntly keeled all round. Stem, leaves, and calyx usually more or less thickly clothed with white meal, which is most abundant when the plant is young.

Var. α, candicans.

PLATE MCLXXXVIII.

C. candicans, *Lam. Fl. Fr. Vol. III. p. 248.*

C. album, var. *commune*, *Moq.-Tand. in D.C. Prod. Vol. XII. Part II. p. 71.*

C. album, *Linn. Herb. (!). Sm. Engl. Bot. 1723.*

Stem often simple, or, if branched, with the branches suberect. Leaves rhombic-triangular-ovate, dentate-serrate, more rarely subhastate and otherwise entire, more or less white with meal, especially beneath. Glomerules collected into short axillary and terminal erect simple, or nearly simple, dense spikes, the axillary ones shorter than the leaves from which they spring; spikes combined into a very slender acute panicle. Calyx thickly clothed with white meal.

Var. β , *viride*.

PLATE MCLXXXIX.

C. viride, *Linn. Herb.* (!). *Reich. Fl. Germ. Excurs.*, p. 579.

C. album, var. *viride*. *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Part II. p. 71.

Stem paniculately branched; branches ascending. Leaves sub-rhomboidal-ovate; the lower ones entire or faintly serrate; the upper ones narrower, entire; all of them green on both sides, or sometimes sparingly sprinkled with meal beneath. Glomerules collected into elongated lax axillary and terminal slightly drooping usually compound cymose lax and interrupted spikes, the axillary ones longer than the leaves from which they spring; spikes or cymes combined into a lax subcorymbose panicle. Calyx very sparingly sprinkled with white meal. Seeds rather smaller than in var. α .

Var. γ , *paganum*.

PLATE MCXC.

C. paganum, *Reich. Fl. Germ. Excurs.*, p. 579.

C. album, var. *viridescens*, *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Part II. p. 71.

Stem paniculately branched; branches ascending. Leaves sub-rhomboidal-ovate; the lower ones irregularly sinuate serrate; upper ones narrower, often entire; all of them green on both sides, or sometimes sparingly sprinkled with meal beneath. Glomerules collected into elongated lax axillary and terminal erect usually compound lax and interrupted spikes, the axillary ones longer than the leaves from which they spring; spikes combined into a lax pyramidal panicle. Calyx very sparingly sprinkled with white meal. Seeds rather smaller than in var. α .

In cultivated ground, waste places, and by roadsides. Common, and generally distributed. Var. α less common than var. β ; var. γ most abundant.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Var. α with the stem 6 inches to 3 feet high, often unbranched or branched merely towards the base; more rarely much branched. Leaves conspicuously stalked, the largest ones $\frac{3}{4}$ to 2 inches long, irregularly toothed, especially towards the base, or sometimes with one or two large teeth near the base, in which case they bear some resemblance to those of *Atriplex*. Glomerules contiguous or nearly so, the spikes scarcely above $\frac{1}{2}$ or $\frac{3}{4}$ inch long. Seeds rather larger than those of *C. Vulvaria*, similar in shape, shining, appearing minutely punctured when examined under a high magnifying power. Plant pale green, the under side of the leaves and calyces almost white

from the abundance of mealy powder, the upper side more thinly sprinkled with it; stem striped with green or reddish. Leaves often turning red at the margins when they wither.

Vars. β and γ are usually larger plants, often 2 to 3 feet high or more, much deeper green, more branched, and with the branches less erect; the glomerules much more distant, and in much longer spikes.

The *C. paganum* of Reichenbach appears to me to bear the same relation to his *C. viride* that the two varieties of *C. polyspermum* bear to each other; but *C. viride* has usually the margins of the calyces more scarious and pale, more mealy, the seeds larger, and the leaves more entire.

I believe var. α may prove a subspecies distinct from vars. β and γ , which pass gradually into each other, but as I have not had an opportunity of testing its constancy by cultivation, I defer to the authority of the majority of botanists by arranging it as a variety. The var. *paganum* is the only one I have raised from seed, and it invariably comes up true. Professor Boreau says that *C. album*, *paganum*, and *viride* all invariably reproduce themselves from seed.

White Goosefoot.

French, *Ansérine blanche*. German, *Gemeiner Gänsefuss*.

The White Goosefoot, or Wild Orache, or Fat Hen, as it is often called, is an abundant annual weed in almost every garden and field. Wherever garden ground is allowed to run to waste or neglected for any time, there this troublesome plant is sure to appear, and multiplying rapidly by seed, soon covers the land. It is usually only regarded as an unwelcome intruder, but it may easily be employed as a useful potherb, and in some parts of our island is commonly boiled and eaten as a vegetable.

SPECIES IV.—*CHENOPODIUM FICIFOLIUM*. Sm.

PLATE MCXCI.

C. serotinum, *Huds.* Fl. Angl. p. 106 (non *Linn.*).

C. viride, *Curt.* Fl. Lond. fasc. ii. Pl. XVI.

C. album, var. *Benth.* Handbk. Brit. Fl. ed. ii. p. 388.

Stem erect, more or less branched, straight; branches ascending. Leaves oblong or subrhombic-oblong, hastate, with the cusps ascending, wedgeshaped at the base, subobtusely, usually sinuate-dentate or sinuate-serrate, with the lowest tooth (except in the upper leaves) much larger than the others, and sometimes the only one present; upper leaves oblong or oblong-shaped, often entire. Flowers in rather small glomerules, arranged in rather long lax ascending slightly compound spikes or in small cymes; in either case sparingly leafy towards the base; spikes or cymes collected into slender or subpyramidal panicles, which are sparingly leafy, except at the apex, which is commonly leafless. Calyx segments keeled on the back, wholly herbaceous, nearly covering the fruit. Seeds all horizontal,

small, not keeled, rather opaque, roughened with minute tubercles. Stem, leaves, and especially the calyx sparingly clothed with white meal, which is most abundant when the plant is young.

In cultivated ground and waste places, chiefly in the vicinity of towns. Rare. It has occurred in Dorset, Sussex, Kent, Surrey, Middlesex, Essex, Norfolk, Cambridge, York, Durham, and Northumberland. Very local in Ireland, where it has been found principally about Dublin and Belfast.

England, Ireland. Annual. Late Summer, Autumn.

C. ficifolium resembles *C. album*, var. *viride*, in the branching of the stem, which is 9 inches to 3 feet high. The leaves, however, have more slender and much longer petioles, especially the upper ones; the lamina is much more parallel-sided, more abruptly contracted and obtuse at the apex, and all the leaves, except the upper ones, are subhastate, or sometimes distinctly 3-lobed, when the basal teeth are much elongated. The glomerules are smaller, closer together, though not nearly so much so as in *C. album*, var. *α*. The spikes are sometimes nearly simple with the branches short, or, in luxuriant specimens, cymosely branched. The calyx segments have very narrow scarious borders. The seed is considerably smaller than in *C. album*, black and distinctly roughened. The plant has generally more meal on it than *C. album*, var. *viride*, but less than *C. album*, var. *candicans*.

Both *C. album* and *C. ficifolium* have often a purple blotch on the stem at the base of the branches.

E. B., 1721, represents a form with dense contiguous spikes, said to have been sent from Yarmouth; but probably this peculiarity has resulted solely from the inaccuracy of the draughtsman, as the spikes are not so in any of the very numerous specimens I have seen.

Fig-leaved Goosefoot.

French, *Ansérine à feuilles de figuier*. German, *Feigenblättriger Gänsefuss*.

SPECIES V.—**CHENOPODIUM MURALE.** *Linn.*

PLATE MCXCII.

Stem erect or ascending, generally branched at the base, and also throughout, branches ascending. Leaves rhombic-ovate, truncate or wedgeshaped at the base, acute, sinuate-serrate or inciso-serrate, with the lowest teeth not larger than the others; upper leaves narrower, but in other respects similar to the lower ones. Flowers in minute glomerules, arranged in short lax spreading leafless branched spikes or cymes; spikes or cymes combined into a slender rather dense terminal panicle, which is leafy, except at the very apex. Calyx segments slightly keeled on the back, nearly covering the fruit, almost wholly

herbaceous. Seeds all horizontal, rather small, sharply keeled all round, opaque, roughened with minute points. Stem and leaves shining, nearly destitute of white meal; calyx clothed with a little white meal.

In cultivated ground and waste places, on manure heaps, and under walls. Rather rare, but generally distributed in England. It is said to have occurred in Forfarshire and near Glasgow, but it seems very doubtful if it be indigenous in Scotland. Very local in Ireland, where it has been found about Cork, Dublin, and once near Belfast.

England, [Scotland?] Ireland. Annual. Late Summer, Autumn.

Stem 6 inches to 2 feet high, often dividing into several nearly equal branches at the base, which are commonly decumbent below, but whether its main divisions be solitary or several, they are usually branched above. Leaves somewhat fleshy, 1 to 3 inches long, the petiole generally shorter than the lamina, which is unequally incis-serrate, with the teeth very sharp, and separated by a rounded sinus. Spikes rather short, distichously and cymosely branched, arranged in a panicle, the upper part of which is quite leafless. Calyx segments less strongly keeled on the back than in the two preceding species, and often permitting a portion of the fruit to be visible. Seed about the size of that of *C. album*, dull black, and with a sharp horizontal keel all round. Stem striped with green and red or white; leaves deep green or bright green, with a greasy lustre, fleshy.

Nettle-leaved Goosefoot.

French, *Ansérine des murs*. German, *Mauer-Gänsefuss*.

SPECIES VI.—**CHENOPODIUM HYBRIDUM.** *Linn.*

PLATE MCXCIII.

C. angulosum, *Lam.* Fl. Fr. Vol. III. p. 249.

C. stramonifolium, *Chev.* Fl. Par. Vol. II. p. 383.

Stem erect, sparingly branched throughout; branches spreading. Leaves ovate or roundish-ovate, subcordate, acuminate, with 2 to 4 angles or cuspidate teeth on each side, the sinus between the teeth entire and rounded; upper leaves narrower, and with much smaller teeth; the uppermost ones very minute, strapshaped. Flowers in rather large glomerules, arranged in lax ascending leafless terminal or lateral branched spikes or cymes; spikes or cymes combined into a large lax pyramidal or blunt-topped terminal panicle, which is leafless, or with only a very few leaves towards the base; in stunted plants with the panicle narrow and rather dense. Calyx segments rough and bluntly keeled on the back, not nearly covering the fruit,

with broad scarious margins. Seeds all horizontal, rather large, not keeled, opaque, coarsely pitted. Stem and leaves slightly shining, nearly destitute of white meal; calyx nearly destitute of meal.

On manure heaps and in cultivated ground and waste places. Rare, and uncertain in its stations. It has occurred in most of the southern counties as far north as Norfolk, Cambridge, Northampton, Warwick, Worcester, and Shropshire; but appears to be absent from the west of the island. On the ballast hills at the mouth of the Tyne, where it has occurred, it is doubtless not native. In Scotland it has been found near Edinburgh, and in Ireland once near Belfast.

England, [Scotland, Ireland]. Annual. Late Summer, Autumn.

Stem stiff, bluntly angular, 1 to 3 feet high, sparingly branched. Leaves distant, 2 to 6 inches long, longer than their petioles. Branches of the inflorescence commonly cymose, but sometimes spicate, arranged in large leafless panicles at the extremity of the stem and upper branches. Calyx segments with very broad pale scarious margins. Fruit nearly the size of a rape seed, much flattened, but without a distinct horizontal keel, dull black, coarsely punctured; stem striped with green, red, or white; leaves dull green on both sides, paler below.

A very distinct species, with the leaves somewhat resembling those of *Datura Stramonium*, the panicle nearly destitute of leaves, those at the base of the upper branches being very minute and strapshaped, and sometimes altogether abortive.

Maple-leaved Goosefoot.

French, *Ansérine hybride*. German, *Unüchter Gänsefuss*.

SPECIES VII.—CHENOPODIUM URBICUM. *Linn.*

PLATE MCXCIV.

Stem erect, simple, or branched at the base; branches erect or ascending. Leaves triangular or rhombic-triangular or deltoid-triangular, irregularly inciso-dentate, rarely nearly entire; upper ones much narrower, smaller, and entire. Flowers in small glomerules, arranged in leafless terminal and axillary lax erect slightly compound spikes; spikes combined into a long slender rather dense tapering pointed panicle, leafy below, but with the apex for a greater or less distance destitute of leaves. Calyx segments not keeled at the back, not wholly covering the fruit, with broad scarious margins. Seeds all horizontal, rather large, not keeled, slightly shining, very finely shagreened. Stem and leaves slightly shining, very sparingly clothed with white meal; calyx with scarcely any meal, even when young.

Var. α , *genuinum*.

Chenopodium urbicum, *Mert. & Koch*, *Deutschl. Fl.* Vol. II. p. 296. *Reich. Fl. Germ. Excurs.* p. 580.

C. melanospermum, *Wallr. Sched. Crit.* p. 112.

C. chryso-melanospermum, "*Balb.*" (*Koch.*)

C. deltoideum, *Lam. Fl. Fr.* Vol. II. p. 249.

C. intermedium, var. *melanospermum*, *Schur*, *Enum. Pl. Transsylv.* p. 572.

Leaves deltoid or deltoid-triangular, subtruncate at the base, the teeth usually rather short or sometimes absent. Spikes longer than most of the leaves, erect; the upper part of the panicle quite leafless.

Var. β , *intermedium*. *Koch.*

PLATE MCXCIV.

C. intermedium, *Mert. & Koch*, *Deutschl. Fl.* Vol. II. p. 297.

C. urbicum, *Sm. Engl. Bot.* No. 717.

C. rhombifolium, *Mühlenb.* in *Willd. Enum. Hort. Berol.* Vol. I. p. 288. *Reich. Fl. Germ. Excurs.* p. 579.

Leaves triangular or rhombic-triangular, usually wedgeshaped at the base, sinuate-dentate, with long irregular teeth. Spikes shorter than most of the leaves, ascending-erect; panicle leafy nearly to the apex.

On manure heaps and rich cultivated ground and waste places, particularly farmyards. Rare. Var. α I have seen from Somersetshire, and from near Chobham and Woking, Surrey. Var. β is apparently more abundant than the other. I have seen it from Horton, near Epsom; near Yarmouth, Suffolk; and it is abundant in the Isle of Wight. One or other of the forms is recorded from Devon, Somerset, Sussex, Kent, Essex, Norfolk, Cambridge, Oxford, Shropshire, and Yorkshire. In Scotland it has been noticed only as an accidentally introduced plant. In Ireland it is very rare, and occurs principally near Dublin.

England, [Scotland,] Ireland. Annual. Late Summer, Autumn.

Stem bluntly angular, erect, 6 inches to 3 feet high, stout, usually simple or with several large branches from the base. Leaves conspicuously stalked, the largest 1 to 3 inches long, exclusive of the petiole (which is scarcely half the length of the lamina, and winged at the apex), with a lateral rib given off at each side of the midrib at a large angle, and running parallel to the entire basal margin on either side; the lower ones generally with the margins scalloped so as to leave acuminate teeth, which vary considerably in length. Panicle usually commencing below the middle of the stem; spikes

1 to 2 inches long, with short branches on all sides, towards the base, and glomerules towards the apex. Flowers all 5-merous. Fruit falling very readily out of the calyx segments, black, strongly shagreened, and separating with difficulty from the pericarp, about the size of that of *C. album*. Plant green, slightly shining, the under side of the leaves, branches, and calyx mealy when young, but losing the greater part of the meal when mature; stem striped with green and dull red or white.

The vars. α and β present considerable difference in appearance, but Koch says he has proved them to be the same by cultivation, and it is often difficult to say to which type particular forms ought to be referred; the state with entire leaves I have only once met with, on the mud dredged from the Thames and laid on Battersea fields during the formation of Battersea Park.

Upright Goosefoot.

French, *Ansérine de ville*. German, *Steifer Gänsefuss*.

SECTION II.—PSEUDO-BLITUM. *Gren. and Godr.*

Annuals, rarely perennials. Lateral flowers, often 3-merous or 4-merous; the terminal ones commonly 5-merous. Stigmas short or rarely elongated. Seeds of the lateral flowers vertical, of the terminal ones horizontal.

SPECIES VIII.—**CHENOPODIUM RUBRUM.** *Linn.*

PLATES MCXCVI. MCXCVII.

Blitum rubrum, *Reich.* Fl. Germ. Excurs. p. 582. *Moq.-Tand.* in *D.C.* Prod. Vol. XIII. Part II. p. 83. *Koch*, Syn. α l. Germ. et Helv. ed. ii. p. 698. *Fries*, Summ. Veg. Scand. p. 34.

Annual. Stem erect or decumbent, simple or branched, especially at the base. Leaves triangular or rhombic-triangular or rhombic deltoid, irregularly inciso-dentate or -serrate or entire; the upper ones much narrower, smaller, entire, or serrate. Flowers in rather large glomerules, arranged in terminal and lateral ascending lax or dense slightly compound spikes, which are leafy, at least towards the base, or rarely leafless; spikes combined into a pyramidal lax or dense panicle, leafy throughout or only at the base. Calyx segments not keeled on the back, wholly covering the fruit (except in the flowers with horizontal seeds), with narrow scarious margins. Stigmas short. Seeds nearly all vertical, very minute, only the terminal one of the spikes sometimes horizontal; the vertical ones very small, not keeled, shining, very finely shagreened; the horizontal ones larger, but in other respects similar. Stem and leaves shining, and, as well as the calyx, destitute of white meal.

SUB-SPECIES I.—*Chenopodium botryoides*. Sm.

PLATE MCXCV.

Stems branched, especially from the base; the lateral branches elongate, spreading or curving upwards. Leaves rhombic or rhombic-deltoid, very thick and fleshy, entire, or rarely with a few shallow teeth. Glomerules of flowers in lax interrupted simple or slightly compound spikes, with spicate or subcymose branches, with minute leaves towards the base, leafless towards the apex; spikes combined into a lax pyramidal panicle destitute of leaves at the apex.

In recently disturbed waste ground and damp places, and by the sides of ditches. Rare, and very local. About Yarmouth, on both the Norfolk and Suffolk sides of the water; also found by Smith at Lowestoft, Suffolk; in 1853 I found it abundantly on the embankment about Shorne Battery, below Gravesend, after the surface of the embankment had been disturbed; and in 1863 Mr. H. C. Watson found it plentifully in a damp hollow where heaps of seaweed are collected after storms, in Pegwell Bay, near Ramsgate; and in this locality, where it grows intermixed with *C. eu-rubrum*, I have procured it every year up to 1866. It is said to occur in Essex, which is not unlikely, but I have seen no specimen from thence.

England. Annual. Late Summer, Autumn.

Stem bluntly angular, 6 inches to 3 feet high, erect, with the lower branches usually decumbent at the base. Leaves 1 to 3 inches long, very thick, fleshy, and brittle, 3-nerved at the base. Spikes resembling those of *C. urbicum*, very long, with the glomerules not contiguous, the lower with short branches or minute leaves at the base, the upper glomerules with merely rudimentary leaves. Flowers very numerous. Panicles quite destitute of leaves at the apex, very lax. Seeds chestnut, not above $\frac{1}{40}$ inch in diameter. Leaves pale yellowish green, often tinged with red; stem striped with white or red; calyx green or red.

This plant bears much resemblance to *C. urbicum*, but the stem is more branched and the branches more spreading, the leaves fleshy and broader, the calyx very rarely with so many as 5 segments, and the seeds are almost all horizontal, and very much smaller; the spikes also are not nearly so erect, so that the panicle is wider at the base, and the glomerules are larger.

Many-clustered Goosefoot.

French, *Ansérine botride*. German, *Weichhaariger Gänsefuß*.

SUB-SPECIES II.—*Chenopodium eu-rubrum*.

PLATES MCXCVI. MCXCVII.

C. rubrum, *Sm. Engl. Bot. No. 1721*.

Stems simple or branched at the base, the lateral branches commonly short and erect or ascending. Leaves triangular or rhomboidal-triangular or rhomboidal, rather thin, irregularly sinuate-serrate, more rarely nearly entire. Glomerules of flowers in dense continuous simple or compound spikes, with very dense spicate or subcapitate branches, with leaves at the base of each branch; spikes combined with rather dense narrow panicles, leafy up to the apex.

Var. α , *genuina*.

PLATE MCXCVI.

Stem stout, slightly branched; branches short, suberect, or ascending. Leaves triangular, coarsely sinuate-serrate. Panicles dense, with short very dense spicate branches.

Var. β , *Pseudo-botryoides*. *Wats.*

PLATE MCXCVII.

C. botryoides, *Bab. Man. Brit. Bot. ed. vi. p. 287 (non Sm.)*.*C. rubrum*, var. *botryoides*, *Auct. Plur.*

Stem slender, decumbent, with elongate lateral branches. Leaves rhomboidal or rhomboidal-triangular, subhastate, otherwise nearly entire, or with a very few teeth on each side. Spikes very short, simple, or with the branches short and spicate or subcapitate.

On heaps of manure and in rich cultivated ground, and in waste places where the soil has been recently disturbed. Rather common, and generally distributed in England. Rare in Scotland, and probably not native north of the Forth of Clyde. Very local and rare in Ireland, where it is confined to the south and east coast. Var. β by the sides of pools at Loo, Cornwall; near Thames Ditton, Surrey; and on sandy coasts at Deal, Kent; and Hunstanton, Norfolk.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

A very variable plant, but usually less branched, or, at least, with the lateral branches shorter, than in *C. botryoides*. Leaves varying from $\frac{3}{4}$ to 5 inches long, toothed or nearly entire, but thinner and less brittle than in *C. botryoides*; the principal difference, however, lies in the inflorescence, the spikes in *C. eu-rubrum* being short, very compact,

and conical, or occasionally with somewhat cymose branches, and with leaves nearly up to the apex, which quite removes the habit of the plant from *C. urbicum*, to which *C. botryoides* closely approximates. The seeds are quite undistinguishable from those of *C. botryoides*. The stem is striped, and often tinged with red, as are also the calyces, though occasionally green; the foliage is dark green, but not unfrequently it is tinged with red.

The var. *Pseudo-botryoides*, from Cornwall and North Surrey, is seldom more than 2 to 4 inches high, but from the seed of the Surrey plant sown in his garden, Mr. H. C. Watson obtained plants 1 foot to 18 inches high, with the stems erect, and in other respects closely approximating to the more common form. This var. seems to have been mistaken for Smith's *C. botryoides* by almost all recent authors. I do not venture to quote *C. crassifolium*, *Hornm.* as a synonym.

Red Goosefoot.

French, *Ansérine rougeâtre.* German, *Rother Gänsefuss.*

SPECIES IX.—CHENOPODIUM GLAUCUM. *Linn.*

PLATE MCXCVIII.

Blitum glaucum, *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 699. *Fries*, Summ. Veg. Scand. p. 34.

Annual. Stem decumbent or prostrate, more rarely erect, sparingly branched, especially at the base. Leaves rhomboidal-elliptical or elliptical or oblong-elliptical, coarsely serrate or sinuate-dentate, more rarely entire, the upper ones similar to the lower. Flowers in small glomerules, arranged in terminal and lateral lax or dense simple or slightly compound spikes, which are leafless, or leafy only at the base; spikes combined into long slender lax panicles, leafy throughout. Calyx segments keeled on the back, not wholly covering the fruit, with very narrow scarious margins. Stigmas short. Vertical seeds, about as numerous as the horizontal; the vertical ones small, bluntly keeled, shining, very finely shagreened; the horizontal ones larger, but in other respects similar. Stem, upper side of leaves, and calyx slightly shining, destitute of meal; under side of the leaves more or less thickly clothed with white meal, especially when young, at which time the leaves are quite white beneath.

On manure heaps and in waste places and cultivated ground. Rare, and not persistent in its stations. It has occurred in most of the counties on the south coast of England, reported also from Glamorganshire, Yorkshire, and the ballast hills at the mouth of the Tyne, and those on the Fifeshire coast; but is probably not truly indigenous, except in the south.

England, [Scotland.] Annual. Late Summer, Autumn.

Stems usually decumbent, or even prostrate, 3 inches to 2 feet long, but sometimes erect, and 3 inches to 2 feet high. Leaves very gradually attenuated into the petioles, the largest 1 to 2 inches long, usually scalloped at the edges. Spikes $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, consisting of minute glomerules, which are usually slightly separated, the lower glomerules only with leaves at the base. Calyx segments varying from three to five in number, even in the flowers with horizontal seeds, which are not all of the same size, but diminished gradually from the largest size, $\frac{1}{20}$ inch, down to the vertical seeds, which are the smallest, and about $\frac{1}{40}$ inch in diameter; the colour is chestnut, and the margin has a distinct but not very sharp keel. The stem is striped with green and white, the upper side of the leaves pale bright green, the under side glaucous or nearly white.

A plant found at St. Sampson's, Guernsey, by Mr. H. C. Watson, in 1865, has the leaves nearly entire, or only repand, which character is retained in cultivation; the glomerules are also much larger and fewer than in the ordinary form.

Oak-leaved Goosefoot.

French, *Ansérine glauque*. German, *Meergrüner Gänsefuss*.

SPECIES X.—**CHENOPODIUM BONUS-HENRICUS.** *Linn.*

PLATE MCXCIX.

Blitum Bonus-Henricus, *Reich.* Fl. Germ. Excurs. p. 582. *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Part II. p. 84. *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 698. *Fries*, Summ. Veg. Scand. p. 654.

Agathophyton Bonus-Henricus, *Mog.-Tand.* Ann. Sc. Nat. Ser. ii. Vol. I. p. 291.

Perennial. Rootstock fleshy, many-headed. Stem erect or decumbent only at the base, simple or sparingly branched. Leaves triangular or deltoid-triangular, hastate or sagittate-hastate, with the cusps spreading or reflexed, acute or subacute, entire or repand, sometimes with 1 or 2 teeth on each side, the upper ones narrower and subrhomboidal. Flowers in short dense simple or slightly compound lateral and terminal leafless spikes; spikes combined with a very long slender panicle, destitute of leaves, except at the very base. Calyx segments not keeled on the back, not wholly covering the fruit, with broad scarious margins, denticulate at the apex. Stigmas elongate. Seeds nearly all vertical, large, not keeled, slightly shining, nearly smooth. Stem and under side of the leaves sparingly clothed with vesicular pellucid meal; calyx destitute of meal.

In waste places, by roadsides, principally near villages, and by farm-yards. Not uncommon, and generally distributed in England and the south of Scotland, reaching north to Ross, Moray, and Dumbarton;

but as the plant was formerly much cultivated as a potherb, it is almost impossible to say in which of its stations it is native and in which it is introduced. Frequent throughout Ireland, but possibly not native there.

England, Scotland, Ireland. Perennial. Summer.

Very unlike all the other species of *Chenopodium* in habit, and differing from them in its perennial rootstock and elongate stigmas. Stem stout, bluntly angular, 1 to 2 feet high or more. Leaves resembling those of spinach, the lower ones on very long petioles, the lamina of the largest 2 to 5 inches long, the sharp apex of the basal lobes usually spreading, but sometimes inclined backwards; the margins generally entire and undulated; indeed, I have never seen them with any teeth, except immediately above the basal cusp. Spikes $\frac{1}{2}$ to 2 inches long, arranged in a very long narrow panicle, of which often as much as 3 or 4 inches at the apex is destitute of leaves. Stigmas (or rather stigmatiferous styles) spreading, usually 2, but sometimes 3. Seeds pitchy black, as large as rape seed, less compressed than in the other species of the genus; the terminal ones of the spikes horizontal, larger, and reniform-subglobular. Pericarp adhering very closely to the seed, and giving it a wrinkled appearance; when it is rubbed off the surface appears smooth, except under a high magnifying power. Plant deep green, the stem and under side of the leaves clothed with minute pellucid vesicles, which make the plant somewhat soapy to the touch; stem striped with green and white or red; perianth yellowish-green or tinged with red.

In this plant the anthers vary from 2 to 5, and, according to Smith, they are sometimes wholly absent in some of the flowers, so that these become polygamous.

Allgood.

French, *Ansérine bon Henri*. German, *Guter Heinrich*.

In Dr. Prior's valuable little book on the "Popular Names of British Plants" we read thus:—"Good Henry, or Good King Harry: German, Guter Heinrich; Dutch, Goeden Henrik. An obscure name, which Dodæus tells us was given to the plant to distinguish it from another, a poisonous one, called *Malus Henricus*; but why they were either of them called *Henricus*, we are not told. Cotgrave gives the name *Bon Henry* to the Roman Sorrel, *Rumex Scutatus*, as well as to the Allgood, the plant to which it is usually assigned. Cordus on Dioscorides, Frankf. 1549, calls it '*Weyss heyderich*, vel ut alii volunt, *Gut heynrich*.' It has nothing to do with our Harry the Eighth and his sore legs, to which some have thought it referred." One writer suggests that this plant was named after Henry the Sixth, who bore, in his own days, the name of Good King Henry, and, as he founded Eton College, he was doubtless a favourite with the monks, from whom many of our plants received their names. Dr. Withering tells us that a French writer says, "This humble plant, which grows on our plains without culture, will confer a more lasting duration on the memory of HENRI QUATRE than the statue of bronze placed on the Pont Neuf, though fenced

with iron and guarded with soldiers." Under the curious names of "Fat Hen," and "Good King Henry," this plant was formerly largely cultivated in gardens as a potherb, and even in the beginning of the present century was highly esteemed in Lincolnshire and some of the midland counties, but is now but little used. It forms a very palatable and wholesome green vegetable when boiled, and much resembles spinach in flavour; the young shoots may be boiled and eaten like asparagus, or put in broths and stews. The whole plant is slightly purgative, but not sufficiently so to be valuable as a medicine. It is easily cultivated, and the crop of green leaves it furnishes during the greater part of the year, was doubtless very welcome before the numerous vegetables now grown in kitchen gardens were introduced.

TRIBE IV.—SPINACIÆ.

Flowers monœcious or polygamous; the female flowers with the perianth 2-valved, and dissimilar to that of the male or perfect flowers. Seed generally with copious albumen; embryo peripheral.

Stem continuous. Leaves flat.

GENUS VI.—**ATRIPLEX**. *Tournef.*

Flowers monœcious or polygamous. Male or perfect flowers with the calyx of 3 to 5 sepals, slightly united at the base: stamens 3 to 5: fruit none, or depressed and containing a horizontal lenticular seed. Female flowers with the perianth compressed, bivalve of 2 free or more or less united sepals: stamens none: styles 2, united at the base: seed vertical, lenticular, with a crustaceous or membranous testa.

Herbs with opposite hastate triangular or rhomboidal leaves, often sprinkled with whitish meal. Flowers in clusters arranged in terminal spikes, often combined into panicles.

The name of this genus of plants is said to be derived from a (*a*) privative, and *ἐφω* (*trephe*) I nourish.

SECTION I.—TEUTLIOPSIS. *Dumort.*

Flowers monœcious. Female flowers with 2 valve-like sepals, joined only at the base. Pericarp membranous, free from the perianth. Testa crustaceous; radicle basal or sublateral.

SPECIES I.—**ATRIPLEX LITTORALIS**. "*Linn.*" *Wahl.*

PLATES MCC. MCCI.

Annual. Stem herbaceous, erect, branched; the branches ascending or curved upwards, and erect at the apex. Leaves alternate or

rarely opposite, strapshaped or oblong-strapshaped or oblong-elliptical, wedgeshaped or attenuated at the base, not hastate, subacute, entire or serrate or sinuate-serrate; the upper ones linear-strapshaped and entire. Flowers monœcious, in glomerules arranged in long slender terminal spikes; spikes interrupted and leafy at the base, more dense and leafless at the apex. Fruit perianth 2-valved; valves united only at the base; rhombic-triangular or deltoid, dentate, irregularly mucronate on the back. Seeds all vertical, rather large, shining, nearly smooth. Stem striped with green and white or red; plant glaucous, more or less thickly clothed with meal.

Var. α , *genuina*.

PLATE MCC.

A. littoralis, *Linn. Sp. Pl.* p. 1494. *Bab.* in *Trans. Bot. Scot. Edin.* Vol. II. p. 5, and *Man. Brit. Bot.* ed. vi. p. 288.

Leaves strapshaped or oblong-strapshaped, entire or very faintly toothed. Fruit perianth triangular at the apex; the larger perianths with the points often slightly recurved.

Var. β , *marina*. *Linn.*

PLATE MCCI.

A. marina, *Linn. Mant.* p. 300. *Bab.* in *Trans. Bot. Soc. Edin.* Vol. II. p. 6, and *Man. Brit. Bot.* ed. vi. p. 288.

A. serrata, *Huds. Fl. Angl.* ed. i. p. 377.

A. littoralis, β , *serrata*, *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Pt. ii. p. 96.

Leaves oblong-strapshaped or oblong-elliptical, deeply serrate or sinuate-serrate. Fruit perianth deltoid or roundish deltoid at the apex; all of them generally with the points adpressed.

In salt marshes and waste places, and especially on embankments by the sea, and particularly by tidal rivers. Var. α common, and generally distributed throughout England, and reaching north to the Fifeshire coast. Var. β apparently more rare, but abundant on the banks of the Thames; it also occurs in the Isle of Wight; Lincoln; York; and it is doubtless not confined to these counties, but passed over as the more common form. Both forms occur in Ireland, but rather rarely.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 6 inches to 4 feet high, the taller forms almost always with broader and more serrated leaves, though such sometimes occur on the small forms as well. Leaves shortly stalked, 1 to 4 inches long, gradually attenuated into the petiole; when toothed the largest tooth never so much exceeds the others as to make the leaves hastate;

uppermost leaves nearly sessile, and narrower than the others both in vars. α and β . Fruit spikes 2 to 8 inches long, the lower glomerules usually rather distant and becoming closer together towards the apex of the spikes, which are arranged in an irregular lax pyramidal panicle. Fruit perianth $\frac{1}{10}$ to $\frac{1}{3}$ inch long, variable in shape, but usually sub-rhombic, with a few blunt teeth above the lateral angles, and a few prominent tubercles on the back, the valves united only for a very little way at the base. Seeds variable in size, the largest ones about the size of rape seed, but much compressed, pitchy black, appearing finely rugose, especially on the beak, under a very high magnifying power. Plant light green, more or less thickly clothed when young with whitish meal, especially on the stems and calyces.

Vars. α and β in their extreme forms look widely different, but I cannot venture to separate them even as subspecies, not only because they are completely connected by intermediate forms, but because besides they do not appear to remain hereditarily constant. The most extreme form of var. β was one I observed on the embankment below Gravesend in 1853. When the earth of the embankment was loose these plants were 3 or 4 feet high, the largest leaves 3 or 4 inches long, and 1 to $1\frac{1}{2}$ inch broad, and the perianth with the apical portion nearly deltoid and closed; but on seeking the plant in the same place again in 1865 I could find none but narrow-leaved plants, with leaves not above $\frac{1}{4}$ inch broad, and the perianth with its apical portion narrower and acute, the tips of the sepals in many of the larger ones recurved. In this case I cannot be certain that the plants in 1865 were the descendants of those in 1853, but it is highly probable they were so. In 1863 I brought from Pegwell Bay seed of an intermediate form, with rather narrow but deeply serrated leaves; I divided the seed into two portions, one of which was sown in a warm light border, the other in a damp stiff bed with a northern aspect. The plants that sprung up in both borders had serrated leaves, those of the seedlings in the light soil rather broader than in the others. The fruit perianths of the plant in the light soil were short and closed, while those in the damp border had the largest in each cluster, twice as long and more recurved at the points than I have ever seen them in wild specimens. As then the two forms of perianth on which stress is laid to discriminate the two varieties, can be found on the seedlings of one parent, there remains only the unreliable character of the entire or toothed leaves to separate them.

Grass-leaved Sea Orache.

French, *Arroche des rivages*. German, *Ufer-Melde*.

The origin of the common name of this plant we find given by Dr. Prior thus:—“Orache, formerly Arach, in Pr. Pm. *Arage*, in MSS. Harl. 978, *Arasches*, French, *arroche*, a word that Menage and Dietz derive from *L. atriplice*. Its Greek name χρυσολάχανον, golden herb, suggests a far more probable explanation of it in a presumed M. Latin *aurago*, from *aurum*, formed, like plantago, lappago, solidago, &c., by the addition of *ago*, wort, to some other noun.”

SPECIES II.—**ATRIPLEX PATULA.** "Linn." Wahl.

PLATES MCCII. MCCIII.

Annual. Stem herbaceous, erect or decumbent, branched; the branches divaricate or curved upwards and ascending at the apex, rarely erect. Lower leaves opposite, rhombic-elliptical or rhombic-triangular, wedgeshaped at the base, hastate with the cusps ascending, acute or subacute, entire or serrate; upper leaves mostly alternate, oblong-strapshaped or elliptical-strapshaped or strapshaped, ordinarily entire. Flowers monœcious, in glomerules arranged in long rather dense terminal spikes, leafy at the base, leafless at the apex. Fruit perianth 2-valved, the valves united only at the base, rhombic or rhombic-deltoid or rhombic-triangular, entire or denticulate, smooth or muricated on the back. Seeds all vertical, rather large, finely rugose. Stem striped with green and white; plant deep green, more or less clothed with white meal.

Var. *α*, *angustifolia*.

PLATE MCCII.

A. angustifolia, *Sm. Engl. Bot. No. 1774.* *Bab. in Trans. Bot. Soc. Edin. Vol. II.* p. 7, and *Man. Brit. Bot. ed. vi. p. 289.*

Stem ascending or procumbent, weak, slender; branches divaricate and often geniculate. Leaves entire or nearly entire, with the basal angle usually less than a right angle. Spikes elongate, rather lax, very long, arranged in slightly branched panicle. Fruit perianth entire, usually not muricated on the back.

Var. *β*, *serrata*.

A. erecta, *Auct. Ang. Plur. (non Sm.).*

Stem ascending or erect, weak, slender; branches divaricate, and often geniculate. Lower leaves denticulate or dentate-serrate, with the basal angle commonly a right angle. Spikes rather short, rather dense, arranged in a very lax slightly branched panicle. Fruit perianth usually denticulate, usually muricated on the back.

Var. *γ*, *erecta*.

PLATE MCCIII.

A. erecta, "*Huds. Fl. Angl. ed. i. p. 376.*" *Sm. Engl. Bot. No. 259.* *Bab. Man. Brit. Bot. ed. vi. p. 279 (in part).*

A. patula, *β*, *muricata*, "*Led. Gren. & Godr. Fl. de Fr. Vol. III. p. 313.*

Stem erect, stout, thick; branches erect or ascending, straight.

Lower leaves serrate or dentate-serrate, with the basal angle a commonly right angle. Spikes rather short, dense, arranged in a large much branched regular panicle. Fruit perianth usually denticulate, usually muricated on the back.

In cultivated ground and waste places, and by roadsides, more rarely on sandy seashores. Var. α very common, and generally distributed. Var. β also common. Var. γ very rare; I have seen it growing only at Twickenham, where it was found by the Rev. W. W. Newbould in 1867; Smith states it was found by Professor Martyn, sen., at the entrance of Battersea Fields from Nine Elms.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem erect or ascending, 6 inches to 2 feet high, generally branched with long lower branches, leaving the stem at a right angle and commonly curving upwards, but sometimes spreading throughout. Leaves 1 to 4 inches long, variable in breadth. Leaves on the main stem always opposite, the lower ones with a large projecting tooth at the lateral angles so as to be hastate, the tooth pointing towards the apex of the leaf; uppermost leaves often alternate, destitute of this tooth; leaves on the branches smaller than those on the main stem and alternate. Spikes usually with the glomerules contiguous above, the lower ones often distant, with leaves at the base as in *A. littoralis*. Perianth variable in size, usually from $\frac{1}{8}$ to $\frac{1}{4}$ inch long, in var. α frequently foliaceous and $\frac{1}{2}$ inch long. Seeds black, rather smaller than those of *A. littoralis*, and much more distinctly punctured. Plant dull dark green, more or less thickly covered, especially when young, with whitish meal, which sometimes, but rarely, obscures the green colour of the plant.

The var. β is often taken for the *A. erecta* of Hudson. It has the leaves usually broader than in var. α , and the branches more erect, and shorter in proportion to the central stems; the leaves being serrated, and the perianth muricated on the back, are certainly little deserving of consideration as separating characters, as they are specially liable to variation in the genus *Atriplex*.

Var. γ is perhaps a subspecies; it has the habit of *Chenopodium ficifolium*, with very stout stiffly erect stems, 18 inches to 3 feet high, and erect or erect-ascending branches; the lower ones much shorter than in the two other vars. The fruit perianth is smaller, and the spikes much denser and more numerous, forming a great panicle like that of *A. deltoidea*, which it resembles also in the dense leafless spikes and small perianth, but the leaves are wedgeshaped at the base with the cusps ascending. It is desirable that experiments should be made to ascertain if this form be constant when raised from seed.

Narrow-leaved Orache.

French, *Arroche étalée*. German, *Ausgebreitete Melde*.

This species is sometimes gathered as a potherb, and eaten instead of spinach and other greens.

SPECIES III.—**ATRIPLEX HASTATA.** *Linn.*

PLATES MCCIV. MCCV.

A. latifolia, *Wahl. Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 702.

Annual. Stem herbaceous, erect or decumbent, branched; branches divaricate or curved upwards and ascending at the apex. Lower leaves opposite, triangular or deltoid-triangular or ovate-triangular, truncate at the base, hastate with the cusps spreading, acute or subacute, dentate-serrate or nearly entire; upper leaves mostly alternate, lanceolate-triangular and hastate or subhastate, or elliptical-lanceolate or elliptical-strapshaped and not hastate; in either case entire. Flowers monœcious, in approximate glomerules arranged in dense leafless spikes, combined into a panicle, or in long interrupted spikes, leafy towards the base. Fruit perianth 2-valved, the valves united only at the base, triangular or deltoid or rhombic-deltoid, entire or denticulate, slightly muricated or nearly smooth on the back. Seeds of two kinds, the larger dark brown and rough, the smaller black, smooth, and shining. Stem striped with green and white or green and red; plant deep green, more or less thickly sprinkled with whitish meal.

SUB-SPECIES I.—**Atriplex deltoidea.** *Bab.*

PLATE MCCIV.

Bab. Prim. Fl. Sarn. p. 83. *Man. Brit. Bot.* ed. vi. p. 289.

Upper leaves usually hastate at the base. Fruit in dense leafless spikes; spikes arranged in a much branched panicle, the terminal spike not much longer than the lateral ones, which are ascending-spreading. Fruit perianth deltoid, truncate or subcordate at the base, not much exceeding the fruit, denticulate, and generally muricated at the back; the greater number of seeds rather small, pitchy or black, shining and smooth; a few of them larger, reddish-chestnut and roughened, rather dim.

Var. α , *genuina*.

PLATE MCCV.

A. deltoidea, *Bab. Trans. Bot. Soc. Edin.* Vol. II. p. 12.

Stem erect. Leaves mostly dentate-serrate, the upper ones hastate. Spikes dense. Fruit perianth denticulate. Plant dull green.

Var. β , *triangularis.* *Bab.**A. prostrata*, *Bab. Trans. Bot. Soc. Edin.* vol. ii. p. 9.*A. triangularis*, "*Willd. Sp. Pl.* Vol. IV. p. 965." *Bab.*

Stem prostrate or decumbent. Leaves mostly entire, the upper ones

generally not hastate at the base. Spikes somewhat interrupted and lax towards the base. Fruit perianth usually entire. Plant grey from the abundance of white meal.

Var. α in cultivated fields, waste places, and by roadsides. Common, and probably generally distributed in England. Apparently rare in Scotland, where I have gathered it only between Edinburgh and Portobello. Var. β common, and generally distributed on the seashore in England: I have not noticed it in Scotland, but it is very probable it occurs there. One of the forms is frequent in Ireland, but I am unable to say which.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Var. α has the stem 6 inches to 3 feet high, much branched. Largest leaves 1 to 4 inches long, terminal. Spikes $1\frac{1}{2}$ to 3 inches long, the lateral ones $\frac{3}{4}$ to 3 inches long, the terminal spike without leaves from its apex to its point, where the uppermost lateral spike is given off; lateral spikes leafless. Perianth in fruit $\frac{1}{10}$ to $\frac{1}{4}$ inch long. Larger seeds about the size of rape seed, the smaller ones much more numerous, and about $\frac{1}{16}$ inch across, the larger ones $\frac{1}{10}$ inch across.

Var. β has the stem prostrate; the leaves entire or only slightly toothed, more fleshy, the upper ones generally not hastate, but quite entire; the spikes are less distinctly paniced, and more lax; the perianth usually larger, and the whole plant clothed with whitish meal, often so abundant that it gives a grey or hoary appearance to the stem, leaves, and perianths.

Triangular-leaved Orache.

French, *Arroche en fer de lance*. German, *Spießblättrige Melde*.

SUB-SPECIES (?) II.—*Atriplex Smithii*.

PLATE MCCV.

A. patula, Sm. Engl. Bot. No. 936. *Hook. & Arn.* Brit. Fl. ed. viii. p. 364. *Bab.* Trans. Bot. Soc. Edin. Vol. I. p. 10 (non *Linn.* Herb.).

A. hastata, *Huds. Bab.* Man. Brit. Bot. ed. vi. p. 289 (non *Linn.* Herb.).

Upper leaves not hastate at the base. Fruit in lax interrupted spikes; spikes arranged in a slightly branched panicle, leafy towards the base, the terminal spike very much longer than the lateral ones, which are erect-ascending. Fruit perianth triangular or rhombic-deltoid, broadly wedgeshaped at the base, considerably exceeding the fruit, nearly entire, and commonly muricated on the back. The greater number of seeds large, reddish-chestnut, rather dim; a few of them smaller, pitchy or black, shining and smooth.

In cultivated ground and in waste places, and by the seashore,

commonly and generally distributed in England and the south of Scotland; less common beyond the Forth and Clyde. Common, and generally distributed in Ireland.

England, Scotland, Ireland. Late Summer, Autumn.

Very like *A. deltoidea*, of which it may be but a variety, but the fruit perianth is much larger, and the spikes more leafy and more interrupted towards the base, the central one so much longer than the others that the paniculate form is obscured. The stems are generally more flexuous, and not so stiff; at least I have found them so when the plant is cultivated in the same garden with *A. deltoidea*, from which, notwithstanding its close approximation, it seems to be hereditarily distinct, at least for one generation.

A. patula of the Linnean Herbarium is a very broad-leaved form of the plant described above on page 29 under that name. *A. hastata* of the Linnean Herbarium is *A. calotheca*, Fries, a very distinct subspecies, which has not occurred in Britain.

Smith's Orache.

SPECIES (?) IV.—**ATRIPLEX BABINGTONII.** *Woods.*

PLATE MCCVI.

Woods Tourist's, Fl. p. 316. *Bab.* Man. Brit. Bot. ed. vi. p. 289.

A. rosea, *Bab.* Trans. Bot. Soc. Vol. I. p. 13, and E.B.S. No. 2880 (non *Lin.*).

A. crassifolia, *Fries*, Mant. 3, p. 163, and Summ. Veg. Scand. p. 54. (non *C. A. Meyer*?).

A. patula, var. γ , *Sm.* Engl. Fl. Vol. IV. p. 258 (ex herb.). *Benth.* Handbk. Brit. Bot. ed. ii. p. 392.

Annual. Stem herbaceous, prostrate or ascending, branched; branches divaricate or curved upwards and ascending at the apex. Lower leaves mostly opposite, deltoid or deltoid-ovate or triangular-ovate, truncate at the base, hastate with the cusps spreading, subacute, dentate-serrate or nearly entire; upper leaves mostly alternate, lanceolate triangular and hastate, or rhomboidal-elliptical or strapshaped-elliptical, in the two latter cases not hastate. Flowers monœcious, in remote glomerules arranged in lax, interrupted, leafy spikes at the extremity of the stem and branches; spikes not combined so as to form a panicle. Fruit perianth 2-valved, the valves united from the base up to the lateral angles, roundish-rhombic or quadrate-rhombic, entire or minutely denticulate towards the apex, smooth or muricated on the back. Seeds large, pale reddish-brown, rough, dim. Stem striped with green and white or red; plant more or less mealy.

On sandy and shingly seashores, and in salt marshes and waste

places by the sea. Common, and apparently generally distributed. In Scotland it is much the most common coast *Atriplex*.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

A very variable plant, at times approaching closely in habit to the maritime forms of *A. hastata*, at others resembling rather *A. arenaria*, with which it has often been confounded. Stems 3 inches to 2 feet long or more, the smaller forms usually more densely clothed with white meal than the larger. Largest leaves $\frac{3}{4}$ to 3 inches long, usually distinctly hastate, sometimes sinuate-serrate, at other times nearly entire. Spikes simple or more rarely somewhat paniced, usually leafy nearly to the apex, with the glomerules so far apart that they might be described as axillary clusters. Fruit perianth $\frac{1}{6}$ to $\frac{1}{4}$ inch long, differing from that of *A. hastata* in being wedge-shaped at the base, more indurated, and generally turning blackish when ripe, and also in the basal margins being united as far up as the lateral angles, which are about half-way up the valves. Seeds about as large as rape seed, finely shagreened. Plant generally much whiter and less shining than *A. hastata*, especially when growing on a sandy coast; but the larger forms, growing on shingle, or in waste places by the sea, are sometimes quite as green, or even greener, than maritime forms of *A. hastata*, of which it may be but a subspecies.

Babington's Orache.

SPECIES V.—**ATRIPLEX ARENARIA.** *Woods.*

PLATE MCCVII.

Bab. Man. Brit. Bot. ed. vi. p. 290.

A. laciniata, *Sm. Engl. Bot. No. 165.* *Bab. in Trans. Bot. Soc. Edin. Vol. I. p. 15.*

Hook. & Arn. Brit. Fl. ed. viii. p. 303. *Linn. Herb. (non Linn. Sp. Pl.) p. 1494.*

A. crassifolia, *Gren. & Godr. Fl. de Fr. Vol. III. p. 10.*

A. rosea, *Benth. Handbk. Brit. Bot. ed. ii. p. 392 (non Linn.).*

Annual. Stem herbaceous, wiry, ascending, much branched; branches ascending and curving upwards. Lowest leaves mostly opposite, rhombic-roundish or quadrate-rhombic, wedgeshaped at the base, not hastate, dentate or sinuate-dentate; middle and upper leaves rhombic or rhombic-oblong, often subhastate with the ascending cusps; otherwise generally entire. Flowers monœcious, in glomerules collected into short spikes at the apex of the stem and branches; the terminal glomerules almost contiguous, nearly leafless, and consisting of male flowers only; the lower ones rather remote, and with leaves at the base, consisting of several male, and from 2 to 7 female flowers. Fruit perianth transversely rhombic or quadrate-rhombic; the valves united up to the lateral angles, wedgeshaped at the base, toothed

immediately above the lateral angles, indurated towards the base, and reticulated and sometimes muricated on the back. Seeds large, reddish-brown, rugose, opaque. Stem dull red, without lines, covered with white scales; leaves and fruit perianth thickly clothed with continuous pellicle of silvery white scales.

On sandy and shingly seashores. I have seen specimens from the Channel Islands; Yarmouth, Isle of Wight; the Kentish coast, from Shellness near Ramsgate to Margate and Whitstable; Southend and Walton, Essex; Fleetwood, Lancashire; Ayr; and Lamlash, Isle of Arran. Mr. Baker records it as occurring at Cotham, and on the north sands at Scarborough; and Mr. H. C. Watson considers a plant from Sutherland to belong to this species, but says the specimens are too young to be determined with certainty. Smith says it grew at Leith and Newhaven, Edinburgh, but it is not to be found there now; probably *A. Babingtonii* was mistaken for it on the shores of the Firth of Forth. In Ireland it is rare and local; it occurs near Roth and Balbriggan, Sligo, and Dr. Dickie says it is frequent in Ulster.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 3 inches to 2 feet long, usually much branched, especially in the lower part; the branches weak, wiry, bluntly angular, spreading in all directions, and curving upwards. Leaves $\frac{3}{4}$ to $1\frac{1}{2}$ inch long; the lower ones, which soon decay, nearly as broad as long, and with petioles about their own length; the greater number alternate, with short petioles; those in the middle of the stem longer than broad, somewhat hastate; all of them insensibly attenuated into the petioles at the base. Fruit perianth variable in size, $\frac{1}{5}$ to $\frac{2}{5}$ inch long, and generally a little broader, differing from all the preceding species in becoming at length indurated and swollen at the base, the lateral angles and the apex very prominent; a few fruits only of each glomerule maturing. Seeds often nearly as large as a hempseed, but much compressed, pale brown, strongly beaked, separating readily from the thin pericarp. Stem without stripes of different colours, dull red (not buff-coloured, as often erroneously stated), thickly clothed with white scales. Leaves and calyces thickly covered on both sides with white scales, which do not rub off as in all the preceding species, so that the plant has a much more silvery appearance than any other of the British species.

I have considered it better to retain Mr. Woods' name, *arenaria*, which was suggested in his paper on *Atriplex*, published in the "Phytologist" for 1849, as it seems to be the only one which is certainly applicable to this plant. *A. laciniata* is represented in the Linnean Herbarium by a specimen of *A. arenaria*, but in the description given in the *Species Plantarum* he says the leaves are deltoid. Now *A. arenaria* appears never to have deltoid leaves. Again, Linnæus states the stem of his *A. laciniata* to be straight and virgate, which is totally

inapplicable to *A. arenaria*, and the female flowers, he says, are axillary and in pairs, but in our *A. arenaria* they are generally much more numerous—although often only 1 or 2 produce seed, yet few but the very smallest specimens have less than 4 or 5 female flowers in the axils of the leaves.

Frosted Sea Orache.

French, *Arroche laciniée*. German, *Gelappte Melde*.

SECTION II.—OBIONE. *Gärt.*

Flowers monœcious or diœcious. Female flowers with 2 sepals united to the middle or free only at the apex. Pericarp very thin, adhering to the tube of the perianth when ripe. Radicle superior.

SPECIES VI.—**ATRIPLEX PORTULACOIDES.** *Linn.*

PLATE MCCVIII.

Obione portulacoides, *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Pt. ii. p. 112. *Bab. Man.* Brit. Bot. ed. vi. p. 290. *Gren. & Godr.* Fl. de Fr. Vol. III. p. 14.

Halimus portulacoides, *Dumort. Bab.* in *Trans. Bot. Soc. Edin.* Vol. I. p. 16. *Koch,* Fl. Germ. et Helv. ed. ii. p. 700. *Fries,* Sum. Veg. Scand. p. 54.

Perennial. Stem shrubby at the base, decumbent or trailing, much branched; branches erect or ascending and curving upwards at the apex. Leaves mostly opposite, oblanceolate or obovate or elliptical, wedge-shaped at the base, subobtusely entire; the upper ones narrower, opposite or alternate; a few of the uppermost strap-shaped; none of them hastate. Flowers monœcious, in glomerules arranged in rather dense leafless spikes, combined into a small lax terminal panicle, with small strap-shaped leaves at the base of the branches. Fruit perianth subsessile, obdeltoïd-rhombic or obovate-rhombic, with the valves united as far up as the points of the lateral lobes, 3-lobed at the apex, smooth or slightly mucronate on the back; the lateral lobes short and subfalcate, the central lobe forming a tooth. Seed small, compressed, brown, rugose, opaque. Stem not striped; leaves densely clothed with contiguous dirty white scales.

In salt marshes, on cliffs and waste places by the sea. Common, and generally distributed in England. Very rare in Scotland, where it occurs on the coast of Wigtonshire; it has also been reported from the banks of the Clyde at Helensburgh, but this report requires verification. Very rare in Ireland, confined to the southern and eastern coasts.

England, Scotland, Ireland. Shrub. Late Summer, Autumn.

Rootstock shortly creeping, woody. Stems flexuous, wiry, 1 to

2 feet long, the lower part nearly round, clothed with reddish-greyish bark. Leaves insensibly attenuated into the petiole, which is very short, the largest ones $1\frac{1}{2}$ to 3 inches long; most of those on the flowering stems with short leafy branches or fascicles of small leaves in their axils. Glomerules with barren and fertile flowers intermixed; spikes slightly interrupted towards the base. Fruit perianth leathery, $\frac{1}{6}$ to $\frac{1}{4}$ inch long, attenuated towards the base, with two somewhat spreading falcate lobes beyond the middle, between which there is a projecting tooth at the apex. Seed rather smaller than rape seed, much compressed, difficult to separate from the calyx, which forms a kind of false capsule open only at the apex over its investing pericarp. Young branches, leaves on both sides, and calyces densely covered with a continuous coating of dirty white scales, which cannot be rubbed off.

Sea Purslane.

French, *Arroche pompier*. German, *Portulakartige Keilmelde*.

SPECIES VII.—ATRIPLEX PEDUNCULATA. *Linn.*

PLATE MCCIX.

- Obione pedunculata*, *Mog.-Tand.* in *D.C. Prod.* Vol. XIII. Pt. ii. p. 115. *Bab. Man.* Brit. Bot. ed. vi. p. 290.
Halimus pedunculatus, *Wallr.* Sched. Crit. p. 117. *Bab.* in Trans. Bot. Soc. Edin. Vol. I. p. 15. *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 701; *Fries*, Summ. Veg. Scand. p. 54.

Annual. Stem herbaceous, erect and nearly simple, or decumbent and much branched; branches divaricate. Leaves mostly alternate, obovate or oblanceolate, wedgeshaped and gradually attenuated into the petiole at the base, subobtusely; the upper ones narrower; none of them hastate. Flowers monœcious, in glomerules arranged in a lax terminal spike, leafy only at the base. Fruit perianth at first subsessile, but at length with a long stalk, obdeltoid or obdeltoid-campanulate, compressed, with the valves united as far up as the points of the lateral lobes, 3-lobed at the apex, smooth on the back; the lateral lobes elongate and subfalcate, the central lobe reduced to a minute mucro. Seed very small, compressed, brown, dim, finely rugose. Stem not striped; leaves densely clothed with contiguous rather dirty white scales.

In grassy salt marshes. Very local. It occurs by the side of the river Stonar, from about a mile and a half beyond Sandwich down to the sea at Shellness, and also near Shorne Battery, below Gravesend, Kent; about Breydon Broad and Aldborough, Suffolk; near Yarmouth, and also at Thornham and Holme-next-the-sea, in Norfolk; by the river-side below Wisbeach, Cambridge, but not recently found there;

also on the coast of Lincoln. In Ireland it is said to have been found at Cushtron Bay, Connemara, but not of late years, and was probably erroneously reported from thence.

England, Ireland (?). Annual. Late Summer, Autumn.

Stem commonly 3 or 4 inches high, and nearly simple, but sometimes a foot or more long, and in that case with branches spreading in all directions. Leaves $\frac{3}{4}$ to $1\frac{1}{2}$ inch long, very similar to those of *A. portulacoides*. Fruit perianth $\frac{1}{8}$ to $\frac{1}{5}$ inch long, supported on a pedicel or attenuated base $\frac{1}{8}$ to $\frac{1}{2}$ inch long; the pedicels in the same glomerule unequal in length, and falling off attached to the calyx. Seed about the size of that of mignonette, very similar to that of *A. portulacoides*, and, like it, separated with difficulty from the calyx. Plant clothed with persistent scales, as in *A. portulacoides*.

Stalked-fruited Sea Orache.

French, *Arroche pedonculée*. German, *Stielfruchtige Keilmelde*.

EXCLUDED SPECIES.

CHENOPODIUM MULTIFIDUM. *Linn.*

Gloucester, Dr. St. Brody—see report of London Botanical Exchange Club for 1866.

CHENOPODIUM AMBROSIODES. *Linn.*

Gloucester, Dr. St. Brody—see report of London Botanical Exchange Club for 1866.

CHENOPODIUM BOTRYS. *Linn.*

“At Bray, Berkshire, Mr. A. Hutton,” Report of Thirsk Botanical Exchange Club for 1861.

CHENOPODIUM OPULIFOLIUM. *Schrad.*

Has occurred occasionally, but is not persistent. I found it on mud dredged from the Thames laid on Battersea Fields in 1853, and Dr. Trimen and Mr. Dyer met with it by the Paddington Canal in 1867.

CHENOPODIUM SEROTINUM. *Linn.*

Dr. St. Brody finds what is probably this obscure species at Gloucester Docks, along with other introduced plants.

BLITUM VIRGATUM. *Linn.*

About Fisherrow, near Edinburgh, I found this plant for a year or two, but it had disappeared in 1853.

ATRIPLEX HORTENSIS. *Linn.*

Found occasionally on waste ground, but only as an escape from cultivation. I have seen this on railway banks and newly-disturbed ground about Leatherhead, Surrey.

ATRIPLEX NITENS. *Reb.*

Has occurred in the Isle of Wight, chiefly on the shore between Ryde and Binstead, and in other places, but does not appear to become permanently established.

ORDER LXII.—POLYGONACEÆ.

Annual or perennial herbs, or more rarely erect or climbing shrubs, with the leaves alternate, very rarely opposite, simple, usually stalked, almost always with the stipules forming a sheath (*ochrea*) enclosing the stem, which, however, is sometimes reduced merely to a ring. Flowers perfect, or more rarely unisexual, and then usually diœcious, regular, commonly in axillary clusters, combined into spikes, racemes, or panicles. Perianth single or double, herbaceous, or coloured like a corolla, with 3 or 6 segments in one whorl, or 4 or 6 in two whorls; the segments free, or more or less cohering at the base, sometimes united into a tube; when free, the inner ones often increasing in size after flowering; aestivation imbricated. Stamens definite, usually from 5 to 8, perigynous, or more rarely hypogynous and seated on a glandular disk. Ovary solitary, free or adhering at the base to the tube of the perianth or to the angles of the ovary, 1-celled and 1-ovuled; ovule orthotropous; styles 3, more rarely 2 or 4, free or combined at the base, sometimes very short, so that the stigmas are nearly or quite sessile. Fruit a small indehiscent nut, 3-sided when there are 3 stigmas, or lenticular when there are only 2, or 4-sided in the few cases in which they are 4. Seed solitary, with a membranous testa and a basal hilum; embryo straight or curved; albumen usually abundant, farinaceous, rarely fleshy.

GENUS I.—RUMEX. *Linn.*

Flowers perfect, more rarely monœcious or diœcious by abortion. Perianth herbaceous, of 6 segments in 2 rows, the 3 outer (*sepals*) slightly cohering at the base, and not accrescent, the 3 inner (*petals*)

becoming much larger and frequently scarious and coloured in fruit, 1 or all of them often furnished with a corky tubercle. Stamens 6, in pairs opposite the exterior leaves of the perianth; anthers innate, firmly fixed to the filaments. Styles 3, filiform; stigmas multified. Fruit a trigonous achene, usually completely enveloped in the enlarged inner perianth leaves. Seed trigonous; albumen copious, mealy; embryo situated at one side of the albumen.

Annual or perennial herbs, rarely undershrubs, with alternate leaves with ochreate stipules. Flowers in alternate fascicles resembling whorls, and arranged in racemes, which are generally combined into panicles. Fruit pedicels recurved-reflexed, articulated between the base and apex.

The name of this genus of plants is derived from a Roman name for a sort of spear, the shape of which the leaves of the species are said to resemble.

SECTION I.—LAPATHUM. *Tournef.*

Styles free. Leaves attenuated or rounded or cordate at the base, never sagittate or hastate. Flowers all perfect or polygono-monœcious.

SPECIES I.—**RUMEX CONGLOMERATUS.** *Murray.*

PLATE MCCX.

R. acutus, *Linn. Herb.!* *Sm. Engl. Bot. No. 724* (non *Linn. Sp. Pl. p. 478*).

Leaves thin, the radical ones oblong-lanceolate, rounded or subcordate at the base, subacute, entire or repand or faintly crenulate, and slightly undulated at the margins; lower and middle stem leaves similar, but smaller; those at the base of the whorls ovate or lanceolate or strapshaped-lanceolate. Branches of the panicle ascending, leafless only at the very apex. Pedicels not much longer than the fruit petals, articulated below the middle, spreading half-way round the stem. Flowers perfect. Enlarged petals in fruit oblong or lanceolate-oblong or subpanduriform, rounded at the base, subobtuse, entire or faintly denticulate at the base, faintly reticulated, each with a large oval-oblong tubercle.

By the sides of ditches and ponds, and in wet meadows, by roadsides and in waste places. Common, and generally distributed.

England, Scotland, Ireland. Perennial. Summer, Autumn.

Rootstock slender. Stem 18 inches to 4 feet high, slender, furrowed. Radical leaves 3 to 8 inches long, exclusive of the petiole, which is shorter than the lamina; stem leaves smaller, and broader in pro-

portion. Panicle lax; the fascicles distant, many-flowered, all of them, except those at the apex of the stem and branches, with a stalked leaf or leaflike bract at the base. Longest pedicels scarcely twice as long as the fruit petals, and often scarcely exceeding them in length; all of them bent downwards from the articulation. Fruit petals about $\frac{1}{8}$ inch long, slightly dilated at the base, and with a long nearly parallel-sided point beyond the tubercle, indistinctly reticulated, olive or more or less tinged with dull red; tubercles very prominent, about half the length of the fruit petal, scarcely twice as long as broad, red or yellowish. Nut dark brown, shining, ovate, trigonous, acuminate, the faces all nearly flat. Plant dull and rather pale green, the stem and veins of the leaves often tinged with red in autumn, when it is sometimes mistaken for *R. sanguineus*.

Sharp Dock.

French, *Patience agglomérée*. German, *Gekrüelter Ampfer*.

SPECIES II.—**RUMEX SANGUINEUS.** *Koch.*

PLATE MCCXI.

R. nemorosus, "*Meyer*;" *Fries*, Summ. Veg. Scand. p. 52. *Gren. & Godr.* Fl. de Fr. Vol. III. p. 37.

R. Nemolapathum, *Wallr.* Sched. Crit. p. 158.

Leaves thin, the radical ones oblong-lanceolate or oblong, often subpanduriform, rounded or subcordate at the base, subacute, entire or repand or faintly crenate, scarcely undulated at the margins; lower and middle leaves similar, but smaller, scarcely at all panduriform, and with shorter stalks; those at the base of the whorls lanceolate. Branches of the panicle ascending, leafless, or with leaves only at one or two of the basal whorls. Pedicels not much longer than the fruit petals, articulated immediately above the base, spreading half-way round the stem. Flowers perfect. Enlarged petals in fruit narrowly-oblong or oblanceolate-oblong, rounded at the base, sub-obtuse, entire, indistinctly reticulated, each of the two inner ones with a strong midrib, but no tubercle, or only a minute one, the outer petal with a large globular-ovoid tubercle.

Var. *α, viridis.* *Koch.*

PLATE MCCXI.

R. viridis, *Sibthorp*, Fl. Oxon. p. 108.

R. nemorosus, *Schrad.* in *Willd.* Enum. Hart. Berol. p. 397.

R. Nemolapathum, *D.C.* Fl. Fr. Vol. III. p. 73.

Stem and veins of the leaves greenish, or the stem and midrib tinged with red in autumn.

Var. β , *genuinus*. Koch.

R. sanguineus, Linn. Sp. Pl. p. 476.

Stem and veins of the leaves blood-red, from their first appearance.

In woods and by roadsides, and in hedgebanks. Var. α rather frequent, and generally distributed in England. Rather rare in Scotland, and not extending to the extreme north. Frequent, and generally distributed in Ireland. Var. β rare, occasionally met with throughout the country, but doubtless often the outcast of gardens.

England, Scotland, Ireland. Perennial. Summer, Autumn.

Extremely like *R. conglomeratus*, but the leaves slightly narrowed in the middle of each side, though not so much as in *R. pulcher*. The panicle is rather more lax, and almost all the whorls on the branches and at the apex of the stem have no leaves at the base, though there is one at the base of each branch, and frequently at the base of the lowest whorls. Pedicels jointed immediately above the base, not considerably above it, as in the last species. Enlarged petals $\frac{1}{6}$ inch long, narrower at the base than those of *R. conglomeratus*, with the tubercle much more globular, not half the length of the petal, those on two of the petals not half the size of the other or absent. Unopened anthers pale yellow, nearly white in the preceding species. Nut similar. Whole plant more or less tinged with red in autumn, but in var. β the leaves have bright blood-red veins. The var. β appears to come up unaltered from seed, but the difference is too slight to constitute a subspecies.

Bloody-veined Dock.

French, *Patient des bois*. German, *Hain-Ampfer*.

SPECIES III.—**RUMEX MARITIMUS**. Linn.

PLATE MCCXII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1948.

Leaves thin, the radical ones strapshaped-oblong or strapshaped-oblongeolate, abruptly wedgeshaped at the base, subacute, entire or repand; lower stem leaves similar, but attenuated towards each end, more acute; leaves at the base of the whorls mostly strapshaped. Branches of the panicle ascending-erect (or none), leafy to the apex. Pedicels* twice as long as the fruit petals, articulated close to the base, spreading all round the stem. Flowers perfect. Enlarged petals

* The pedicels in the false whorls are unequal in length, but the size given in the description is that of the longest.

in fruit rhombic-triangular, wedgeshaped at the base, acute, with two setaceous teeth on each side about the middle, reticulated, each of them with a long oblong-cylindrical tubercle; teeth bristle-like, as long as or longer than the length of the petal. Sepals much shorter than the tubercle. Nut attenuated at each end, broadest in the middle.

In wet places. Rare, but widely distributed in England, except in the extreme north. Not certainly known to occur in Scotland, though it has been reported from several stations. In Ireland, it is found only in Curragha bog near Garristown, co. Dublin.

England, Ireland. Biennial. Late Summer, Autumn.

Stem rooting at the lower nodes, erect, 6 inches to 2 feet high, simple when small, branched with incurved branches when large. Radical leaves in a rosette, abruptly attenuated into short petioles, the lamina commonly unequal at the base, 2 to 9 inches long, rather broader towards the apex, slightly undulated; lower stem leaves similar to the radical ones, but attenuated towards the apex as well as to the base, so as to be widest in the middle; leaves at the base of the whorls nearly sessile, elliptical-strapshaped, spreading, all much longer than the whorls. Fruit whorls many-flowered, globular, approximate, often confluent, but by no means always so, especially when the main stem is injured, for then it sends out secondary shoots, which have the whorls quite distinct. Fruit petals bright yellow, $\frac{1}{10}$ to $\frac{1}{8}$ inch long, the spines $\frac{1}{8}$ to $\frac{1}{6}$ inch long; tubercle more than half as long as the petal, pale yellow. Nut $\frac{1}{10}$ inch long, shining, trigonous, with the faces elliptical, equally attenuated at each end, fawn colour. Plant yellowish-green, glabrous.

Golden Dock.

French, *Patience maritime*. German, *Goldgelber Ampfer*.

SPECIES IV.—**RUMEX PALUSTRIS.** *Sm.*

PLATE MCCXIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1760.

R. palustris and *R. Stenii* (*Beck.*), *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 704.

R. limosus, *Thuil.* Fl. Par. p. 182.

R. maritimus, *Hoffm.* Deutschl. Fl. ed. ii. p. 172. *Curt.* Fl. Lond. Vol. I. tab. 68.

Leaves thin, the radical ones strapshaped-oblong or strapshaped-oblongate, abruptly wedgeshaped or subcordate at the base, subacute; lower stem leaves similar but more attenuated towards the apex; leaves at the base of the whorls strapshaped or elliptical-strapshaped. Branches of the panicle spreading-ascending, leafy to the apex. Pedicels nearly twice as long as the fruit petals, articulated close to the base, spreading all round the stems. Flowers perfect. Enlarged petals in fruit triangular,

subtruncate at the base, acute, with 2 or 3 setaceous teeth on each side about the middle, reticulated, each with an oblong-ovoid tubercle; teeth bristle-like, shorter than the length of the petal. Sepals as long as the tubercle. Nut broadest towards the base.

In wet places. Rare, but widely distributed throughout England. Not known certainly to occur in Scotland, though said to have been found near Dunbar. In Ireland it is not known to occur.

England. Biennial. Late Summer, Autumn.

Very like *R. maritimus*, with which Mr. Bentham joins it, but it is a larger plant, with the stems often 2 or 3 feet high, often more or less decumbent, and always branched, with the branches curving inwards. Leaves not distinguishable from those of *R. maritimus*; for though usually larger and more abrupt at the base, the same series of forms occurs in each. The whorls have usually fewer flowers, and are more distant than in *R. maritimus*, but sometimes they are confluent as in that species. The fruit petals are $\frac{1}{5}$ inch long, yellowish-olive, broader at the base, and so more triangular; the tubercles yellowish-white, sometimes more or less tinged with red, about half the length of the sepal, much larger and broader in proportion than in *R. maritimus*; the teeth are broader at the base and much shorter, and the sepals are much longer. The nut is rather more than $\frac{1}{2}$ inch long, darker in colour, broadest near the base, and acuminate at the apex, so that its faces are ovate.

R. limosus, Thuillier, is commonly referred to *R. palustris*, but it is possible that it is made up of forms of *R. maritimus* with distant whorls, as well as of states of *R. palustris*. The form of the base of the leaves is too variable to found even a variety upon.

The plate in Engl. Bot. ed. i. No. 1932, is drawn partly from *R. pratensis*, but the dissections belong to the true *R. palustris*.

Yellow Marsh Dock.

SPECIES V.—**RUMEX PULCHER.** *Linn.*

PLATE MCCXIV.

Billot, Fl. Gall. et Germ. Exsicc. No. 3196.

Leaves thin, the radical ones broadly oblong or ovate-oblong, panduriform, subcordate or cordate at the base, obtuse, crenate and slightly undulated at the edges; lower stem leaves similar, but narrower and on shorter stalks; leaves at the base of the whorls lanceolate or elliptical; the upper ones strapshaped and sessile. Branches of the panicle divaricate, leafy nearly to the apex. Pedicels shorter than the fruit petals, articulated below the middle, spreading half-way round the stem. Flowers perfect. Enlarged petals in fruit oblong-triangular,

truncate at the base, subobtuse, cut into numerous rather short subulate spines in the basal half, very strongly alveolate-reticulate, each of them with a prominent lanceolate-cylindrical tubercle; that on the uppermost petal larger than that on the two others; tubercles frequently squamose-muricate.

By roadsides and in waste places, particularly in chalky and sandy districts. Rather common, and generally distributed in the south of England, extending north to Lincoln, Notts, Stafford, and Pembroke; also on the ballast hills at the mouth of the Tyne, but probably not native there. It has been reported from Lanarkshire in Scotland, but doubtless erroneously. Very rare and doubtfully native in Ireland, where it is confined to the vicinity of Dublin.

England, Ireland ? Biennial or Perennial. Late Summer, Autumn.

Rootstock slender, producing the first year a rosette of spreading leaves; with the lamina 2 to 6 inches long, exceeding the petiole, decaying in the second year shortly after the plant flowers. These leaves are remarkable for being contracted above the base, so as to be fiddleshaped. The second year 1 or more flowering stems are sent up. Stem at first erect, afterwards arching and flexuous, 6 inches to 2 feet long; the branches slender, wiry, divaricate, often forming nearly a right angle with the main stem, and frequently curved downwards at the apex. Leaves becoming smaller the higher they are placed on the stem. Whorls remote, most of them leafy, few-flowered, arranged in a lax straggling panicle. Pedicels short, thick, abruptly recurved, much less liable to disarticulate when the fruit is mature than those of the four preceding species. Fruit petals pale olive, $\frac{1}{2}$ inch long, with the veins extremely prominent, especially towards the base; the lower half or two-thirds with 4 to 8 stout marginal spines of unequal size, the longest scarcely attaining a length equal to the width of the petal; tubercles pale or reddish, slender, but very prominent, gradually attenuated into the midrib; the largest tubercle more than half the length of the petals; that on the 2 lower (which, from the curving of the pedicels, are also the inner) petals, smaller and shorter. Nut $\frac{1}{10}$ inch long, ovate, triquetrous, brown, nearly smooth, slightly shining. Plant dull green, glabrous, or with only a few hairs in British specimens, though in the south of Europe it is frequently densely clothed with cartilaginous hairs when it is the *R. divaricatus* of Linnæus.

Fiddle Dock.

French, *Patience violon*.

SPECIES VI.—**RUMEX OBTUSIFOLIUS.** "*Linn.*" Auct. Plur.

PLATE MCCXV.

R. Friesii, *Gren. & Gr. Fl. de Fr.* Vol. III. p. 36.

R. divaricatus, *Fries*, *Mant.* iii. p. 25, and *Summ. Veg. Scand.* pp. 51 and 202 (non *Linn.*).

Leaves thin, the radical ones very broadly oblong or ovate-oblong, not panduriform, cordate at the base, subacute or subobtuse, crenate-repand and slightly undulated at the margins; lower stem leaves similar, but narrower, and on shorter stalks; leaves at the base of the whorls elliptical or lanceolate-elliptical, stalked. Branches of the panicle ascending or erect-ascending, leafless, except at the very base. Pedicels once and a half or twice as long as the fruit petals, articulated a little below the middle, spreading nearly all round the stem. Flowers perfect. Enlarged petals in fruit triangular, truncate at the base, obtuse, cut into several rather long triangular setaceous-pointed teeth in the basal half, strongly reticulate; the two lower ones rather smaller than the upper one, with a slender linear-lanceolate tubercle; the upper petal with a large short ovate-ovoid tubercle; tubercles not muricated.

By roadsides and on waste ground, cultivated fields and pastures. Very common, and universally distributed.

England, Scotland, Ireland. Perennial. Summer, Autumn.

Rootstock thick, blackish, the apex clothed with filaments formed of the decayed petioles of previous years. Radical leaves sometimes very large; the lamina sometimes 6 inches to 1 foot long, the breadth half to one-third of the length. Flowering stem 18 inches to 3 feet high or more, branched; the branches making but a small angle with the stem, so that the panicle is long, narrow, and compact; whorls generally approximate, many-flowered, most of them leafless. Pedicels slender, recurved from below the articulation, not above it, as in *R. pulcher*. Fruit petals $\frac{1}{3}$ to $\frac{1}{4}$ inch long, olive, generally tinged with red, each margin with 3 (rarely 2 or 4) long spreading teeth, the longest of which is about as long as the width of the petal; apex of the petal entire, and less strongly veined than the base; tubercles generally red; those on the two lower petals slender, and frequently little more than a thickening of the midrib towards the base. Nut about $\frac{1}{8}$ inch long, very broadly ovate, triquetrous, light yellowish-brown, smooth, slightly shining. Plant deep green, the stem and veins often tinged with red, the whole plant frequently becoming bright red in autumn. Stem often with lines of short hairs; underside of the leaf veins papillose.

I have retained the name "*obtusifolius*" for this species, as it is the one generally applied to it, and doubtless Linnæus included it under that name, though Fries is probably correct in considering that he more

especially intended the *Rumex sylvestris* of Wallroth (Sched. Crit. p. 161). It ought to be looked for in Scotland, and may be readily known by its more abruptly acuminate, smaller, and shorter fruit petals, shortly toothed towards the base, and with a less strongly marked network of veins. I am unacquainted with the plant, but Koch says it passes into *R. obtusifolius* by numerous intermediate forms, so that at the utmost it appears to be only a subspecies.

Broad-leaved Dock.

French, *Patience à feuilles obtuses*. German, *Stumpfblättriger Ampfer*.

SPECIES VII.—**RUMEX PRATENSIS.** *Mert. and Koch.*

PLATE MCCXVI.

R. acutus, *Fries*, Summ. Veg. Scand. pp. 52 and 202. *Gren. & Godr.* Fl. de Fr. Vol. III. p. 38 (non *Linn.* Herb.!).

R. cristatus, *Wallr.* Sched. Crit. p. 163 (non *D.C.*).

Leaves thin, the radical ones broadly-oblong or lanceolate-oblong, not panduriform, subcordate or rounded at the base, subacute, crenate-repand and slightly undulated at the margins; lower stem leaves similar, but narrower, on shorter stalks, not cordate at the base, and more acute; leaves at the base of the whorls strapshaped-elliptical, shortly-stalked. Branches of the panicle ascending-erect, leafless except at the very base. Pedicels about twice as long as the fruit petals, articulated considerably below the middle, spreading nearly all round the stem. Enlarged petals in fruit roundish-deltoid, subcordate at the base, obtuse, cut into several short deltoid-triangular-acuminate teeth in the basal two-thirds, strongly reticulate; one of the lower ones considerably smaller than the upper one, and each of them with a very slender linear-lanceolate tubercle, sometimes reduced to a thickened midrib, or with a more prominent lanceolate one, rarely with an ovoid tubercle; the upper petal with a large short ovate-ovoid tubercle; tubercles not muricated.

By roadsides and in waste ground, cultivated fields and pastures. Rather rare, but probably distributed over the greater part of England; for though it has been recorded from only about half the counties, it is very liable to be passed over as *R. obtusifolius* or *R. crispus*. Rare in Scotland, where I have gathered it only near Musselburgh and Aberdeen. Rare in Ireland, where it has occurred near Killarney and Belfast, and in co. Mayo.

England, Scotland, Ireland. Perennial. Summer, Autumn.

R. pratensis differs from *R. obtusifolius* in the leaves being narrower, less cordate at the base, and more acute; the stem leaves especially are

much narrower, and very decidedly acute; the pedicels are longer, and the racemes which form the panicle more erect. The enlarged petals are $\frac{1}{5}$ to $\frac{1}{4}$ inch long, and nearly as broad, more or less cordate at the base, abruptly acuminate into a short deltoid point; the basal part cut into 5 or 8 unequal teeth, the longest of which is not above $\frac{1}{4}$ the breadth of the petal; the two lower enlarged petals purplish red, more rarely olive tinged with red, frequently with scarcely any tubercle, and the upper one with a very prominent tubercle about half the length of the petal. Nut generally abortive, which favours the idea of its hybrid origin; when perfect $\frac{1}{10}$ inch long, very broadly ovate-triangular, light brown, smooth, shining. Professor Babington says he has found the nuts abundant and elliptic, while I have never been able to find more than 3 or 4 on a plant, and all I have seen were much broadest towards the base, so that the faces are ovate-acuminate, not elliptic. Plant light green, often tinged with dull purplish red, glabrous.

This plant is so nearly half-way between *R. obtusifolius* and *R. crispus* that I am much inclined to regard it as a hybrid between the two, as suggested by Koch himself. Indeed, the chief point to be urged against this view is its great abundance.

Meadow Dock.

German, *Wiesen Anisfer*.

SPECIES VIII.—**RUMEX CONSPERSUS.** *Hartm.*

PLATE MCCXVII.

R. confertus, "*Willd. Enum. Hort. Berol.* p. 397" (*Fries*).

Leaves thin, the radical ones broadly oblong, not panduriform, cordate or abrupt at the base, obtuse, repand and considerably undulated at the margins; "petioles flat on the upper side, laterally compressed above" (*Fries*); lower stem leaves similar, but narrower, subobtuse, and on shorter stalks; leaves at the base of the whorls elliptical, shortly stalked. Branches of panicle ascending, leafless except at the very base. Pedicels about twice as long as the fruit petals, articulated a little below the middle, spreading nearly all round the stem. Flowers perfect. Enlarged petals in fruit roundish-deltoid, subcordate at the base, obtuse, cut into numerous very short irregular deltoid teeth from the base nearly to the apex, strongly reticulated; one of the two lower ones considerably smaller than the upper one, and both with very slender linear-lanceolate tubercles, which is sometimes reduced to a thickened midrib; the upper petal with a large short ovoid tubercle; tubercles not muricated.

Found by Professor Walker Arnott in Kinrosshire, particularly in the parish of Orwell.

Scotland. Perennial. Late Summer, Autumn.

This plant differs from *R. pratensis* in the lower leaves being more decidedly cordate, the fruit petals larger, $\frac{1}{4}$ to $\frac{3}{8}$ inch long, denticulated nearly and sometimes quite to the point; the teeth are shorter than in *R. pratensis*. Nut larger ($\frac{1}{8}$ inch long), darker coloured and more acuminate towards the apex. The stem generally has a few hairs on the striæ, as in *R. obtusifolius*, from which it is distinguished by its much larger broader and more cordate fruit petals, destitute of distinct spines, and without a long entire point.

This, as suggested by Dr. Walker Arnott, is probably a hybrid between *R. obtusifolius* and *R. domesticus*; but, after careful observation, neither Mr. Hewett Watson nor myself can see any difference between Dr. Walker Arnott's specimens and a Swedish example of *R. conspersus* sent to Mr. Watson by Mr. Carl Hartman. Judging from Fries' description, however, the plant appears to come nearer *R. cordifolius* of Hornemann; but as Hartman must be acknowledged to be a better judge of his father's species than Fries, I have retained the name of "*conspersus*."

It is greatly to be wished that this plant could be more carefully examined in a recent state, and that both it and *R. pratensis* could be raised from seed, if possible, when perhaps the question might be settled whether they be hybrids or distinct species.

Hartman's Dock.

SPECIES IX.—**RUMEX CRISPUS.** *Linn.*

PLATE MCCXVIII.

Leaves thin, the radical ones oblong-elliptical or elliptical, abrupt or gradually attenuated at the base, subacute, repand and strongly crisped at the margins; petioles semicylindrical, flat above, with a prominent margin on each side decurrent from the base of the lamina; lower stem leaves similar to the radical ones, but narrower, more acute, and on shorter stalks; leaves at the base of the whorls strapshaped, subsessile. Branches of the panicle erect, leafless except at the base. Pedicels about twice as long as the fruit petals, articulated a little above the base, spreading nearly all round the stem. Flowers perfect. Enlarged petals in fruit roundish-deltoid, subcordate at the base, subobtuse, entire or faintly denticulate, rather strongly reticulated; one of the two lower ones considerably smaller than the upper one, and each of these with a very slender indistinct linear tubercle, often reduced to merely a thickened midrib, or more rarely with a lanceolate-ovoid tubercle, the upper petal always with a large rather short ovate-ovoid tubercle; tubercles not muricated.

By roadsides, in waste places, cultivated ground, pastures, &c. Very common, and generally distributed.

England, Scotland, Ireland. Perennial. Summer, Autumn.

Rootstock thick. Stem erect, 18 inches to 4 feet high, branched. Radical leaves 5 to 9 inches long, much more crisped at the margins than in any of the preceding species. Whorls with rather numerous flowers, generally approximate. Pedicels slender, articulated nearer to the base than to the middle, bent downwards at the articulation, or a little above it. Fruit petals $\frac{1}{8}$ to $\frac{1}{4}$ inch long, olive, frequently tinged with a dull brownish red, generally quite entire, but sometimes subdentate in the lower half, but much less deeply so than in *R. pratensis* and *R. conspersus*; tubercle on the uppermost petal about half as long as the petal; those of the two other petals generally rudimentary, but sometimes nearly as large and prominent as that on the upper petals. Nut with roundish-ovate faces, much acuminate, $\frac{1}{10}$ inch long, brown, smooth, shining. Plant dull green, the stem and leaves frequently tinged with purplish-brown, especially in autumn. Plant glabrous, or with a few hairs on the stem; lateral veins of the leaves slightly papillose beneath.

The specimens which I have seen of the form with all the petals bearing tubercles, have the fruit petals smaller and rather narrower in proportion than that which has a distinct tubercle on the upper petal only.

Curled Dock.

French, *Patience crépie*. German, *Krauser-Ampfer*.

The origin of the common name of this plant and its allies is very obscure, and even Dr. Prior does not appear to have ascertained it satisfactorily. He says, "It is not at all obvious how the words, *dilla*, *paradella*, *padella*, and *dona* came to be applied to the broad-leaved plants called *dock* in later times, viz. the water-lilies, mallows, burdocks, and sorrels. Possibly from their external application as soothing remedies to tender surfaces, these last were comprised under the same category as the dills or carminative plants used to lull pain. Old herbals and vocabularies give no support to the view of some etymologists, that dock means 'stump.' It was not confined to stumpy plants, and there is no such word as *dock*, with the meaning of 'stump,' in the ancient Saxon language." The Curled Dock is applicable to all the purposes for which the other species are used. The fresh roots, bruised and made into an ointment, are said to cure the itch. The seeds have been given with advantage in dysentery.

SPECIES X.—**RUMEX DOMESTICUS.** *Hartm.*

PLATE MCCXIX.

R. aquaticus, *Hooker* in *E.B.S.* No. 2698. *Bab. Man. Brit. Bot. ed. v. p. 283. Hook. & Arn. Brit. Fl. ed. viii. p. 374. Benth. in Handbk. Brit. Bot. ed. ii. p. 394* (non *Lin.* Herb. ! nec *Smith*).

R. longifolius, "*D.C.*" *Meisner*, in *D.C. Prod. Vol. XIV. p. 44.*

Leaves thin, the radical ones oblong-elliptical or lanceolate-oblong,

abrupt or gradually attenuated at the base, subacute, repand, and rather strongly crisped at the margins; petioles semicylindrical, flat above, with a prominent margin on each side decurrent from the base of the lamina; lower stem leaves similar to the radical ones, but narrower, on shorter stalks, and more acute; leaves at the base of the whorls strapshaped-elliptical, subsessile. Branches of the panicle erect, leafless, except at the base. Pedicels slender, not much longer than the fruit petals, articulated a little below the middle, spreading nearly all round the stem. Flowers perfect. Enlarged petals in fruit deltoid-orbicular, deeply cordate at the base, obtuse, entire or faintly denticulate, rather faintly reticulated; one of the two lower ones considerably smaller than the upper one, and all three with the midrib merely slightly thickened, not raised into a distinct tubercle.

In wet meadows and by the side of streams and ditches, also by roadsides and in cultivated fields. Rather common, and generally distributed throughout Scotland and the north of England, but not known to occur south of Yorkshire.

England, Scotland. Perennial. Late Summer, Autumn.

R. domesticus is probably often confounded with *R. crispus*, but the radical leaves are much larger, 6 to 15 inches long, and much broader in proportion, and also not so much crisped. The branches of the panicle are usually more densely flowered. The pedicels are shorter in proportion to the fruit petals, and articulated nearer to the middle. The fruit petals are much larger, $\frac{1}{4}$ to $\frac{1}{3}$ inch long, rounder, more cordate, of a more membranous texture, and without any evident tubercle, although the midrib is sometimes raised at the base so as to form the rudiment of one. The nut is narrower, the faces being ovate instead of roundish-ovate, and it is a little larger than that of *R. crispus*. The plant is hardly ever tinged with red, the fruit petals remain of a pale olive, and when fully ripe become tinged with pale dull brown.

The panicle is more compact and fusiform in *R. domesticus* than in any of the British Rumices except *R. alpinus*.

Grainless Curled Dock.

French, *Patience domestique*. German, *Haus-Ampfer*.

SPECIES XI.—RUMEX HYDROLAPATHUM. Huds.

PLATE MCCXX.

R. aquaticus, *Sm.* Engl. Bot. No. 2104 (non *Linn.*).

Leaves subcoriaceous, the radical ones elliptical or elliptical-oblongate, gradually attenuated at the base, and insensibly decurrent into flat

petioles, acute, very finely repand-crenulate and flat at the margins; lower and middle stem leaves similar but smaller, less gradually attenuated, and with shorter petioles; leaves at the base of the whorls strapshaped-elliptical or strapshaped. Branches of the panicle ascending-erect, nearly leafless. Pedicels longer than the fruit petals, articulated below the middle, spreading half-way round the stem. Flowers perfect. Enlarged petals ovate-triangular, acuminate, wedgeshaped-truncate at the base, acute, entire or faintly denticulate, rather strongly reticulate, each of them with a lanceolate-oblong tubercle.

In ditches and by the sides of streams and ponds. Frequent and generally distributed in England, though rather local. Rare in Scotland, where it certainly occurs in the island of Islay; it has been reported from numerous other stations in Scotland, but these require to be confirmed by competent authority. Rather local, but generally distributed in Ireland.

England, Scotland, Ireland. Perennial. Late Summer, Autumn.

Rootstock thick, black. Stem erect, furrowed, 3 to 6 feet high, branched in the upper part. Radical leaves, including the petiole, 1 to 3 feet long, erect, gradually attenuated towards the base and apex. Petioles flat on the upper face and not winged at the margins, convex and furrowed beneath. Ochreæ at length tearing into slender lacineæ. Panicle very large, pyramidal-fusiform, rather dense. Whorls separated from each other by a distance about equal to the length of the pedicels, the upper ones on the stem and on each branch leafless. Pedicels unequal in length, the longest twice as long as the fruit petals. Fruit petals $\frac{1}{4}$ to $\frac{3}{8}$ inch long, reddish or olive-fawn colour; the two outer ones somewhat channeled and concave, the inner one nearly flat; all of them with a red or yellowish white tubercle nearly half as long as the enlarged petal, the one on the flat petal generally smaller than those on the two channeled ones; the veins prominent and forming a raised network on all of them. Nut $\frac{1}{6}$ inch long, fawn colour, shining, acuminate at each end, triquetrous, two of the faces channeled, the third one nearly flat. Leaves dull green, not shining. Plant glabrous.

Great Water Dock.

French, *Patience à longues feuilles*. German, *Fluss-Ampfer*.

This tall species of dock is very common on river banks, and has some reputation as an antiscorbutic. Its root is strongly astringent, and it makes, when powdered, a good dentifrice. It is said to be the *Herba Britannica* of Pliny, though certainly not confined to the British Islands.

SPECIES XII.—**RUMEX ALPINUS.** *Lin.*

PLATE MCCXXI.

Leaves thin, the radical ones roundish or roundish-ovate, deeply cordate, obtuse, repand and nearly flat at the margins; lower and middle stem leaves similar to the radical ones, but smaller, more ovate, and on shorter stalks; those at the base of the whorls not cordate; the uppermost ones lanceolate, shortly stalked. Branches of the panicle erect, leafless, except at the very base. Pedicels nearly twice as long as the fruit petals, articulated a little below the middle, spreading nearly all round the stem. Flowers monœcious. Fruit petals ovate, wedgeshaped-truncate at the base, obtuse, entire or faintly denticulate, rather faintly reticulated; all nearly equal and without any tubercle, the midrib, even at the base, being scarcely more prominent than the other veins.

In pastures, and by the sides of streams and roads in hilly districts. Rare, and doubtless the remains of ancient cultivation. Near One Ash Grange, Derbyshire, in Dumfriesshire, Dumbartonshire, Perthshire, Clackmannanshire, and Fifeshire.

[England, Scotland.] Perennial. Summer.

Rootstock very thick. Radical leaves 6 to 15 inches long, and nearly as broad, somewhat like those of rhubarb. Panicle very dense, fusiform, and bearing much resemblance to that of *R. domesticus*. Fruit petals $\frac{1}{5}$ to $\frac{1}{4}$ inch long, pale olive, membranous. Nut $\frac{1}{8}$ inch long, broadly lanceolate-triquetrous, yellowish-grey, smooth, and shining. Plant light green; the stems and petioles generally tinged with red.

Monk's Rhubarb.

French, *Patience des Alpes*. German, *Gebirgs-Ampfer*.

This species of dock seems to have had an ancient reputation as a medicine, and is also, according to Gerard, "an excellent wholesome potherb." He gives a prescription, consisting of the roots of Monk's rhubarb, red madder, senna, anise, and liquorice, with strong ale, which he extols as a remedy for most bodily ailments. Several species have been used medicinally; but this was a favourite plant in the gardens of monasteries, and its root has in some degree the properties of Turkey rhubarb. It is mentioned by Tusser in 1573 as being then cultivated in England, and was said to be an invaluable remedy for the ague. Culpepper says, "All docks being boyled with meat, make it boyl the sooner; besides, they procure good blood. Yet such is the nicety of our times, forsooth, that women will not put it in the pot, because it makes the pottage black; Pride and Ignorance (a couple of monsters in the creation) preferring nicety before health."

SECTION II.—ACETOSA. *Tournef.*

Styles adnate to the angles of the ovary. Leaves commonly sagittate or hastate, acid. Flowers generally polygamous or monœcious, or dicecious.

SPECIES XIII.—**RUMEX SCUTATUS.** *Linn.*

PLATE MCCXXII.

Leaves very succulent, roundish deltoid, subpanduriform, hastate or hastate-sagittate, with the basal lobes divaricate, subobtuse; lower stem leaves similar; the upper ones narrower and more triangular and frequently acute; all stalked. Ochreae entire, dim, pure white. Branches of the panicle few, ascending, leafless. Pedicels rather shorter than the fruit petals, articulated a little below the middle, spreading half-way round the stem. Flowers monœcious. Sepals applied to the base of the fruit petals. Enlarged petals in fruit scarious and somewhat coloured, suborbicular, deeply cordate, rounded at the apex, entire, extending far beyond the nut, rather faintly reticulated, destitute of tubercles, and without greatly thickened midribs. Leaves acid, glaucous.

On old walls and in pastures. Rare, and certainly not native. It occurs in Glamorganshire; at the head of Silverdale in Yorkshire; near Keswick, Cumberland. In Scotland it is naturalised at Craigmillar Castle, near Edinburgh; it is also reported from Burntisland in Fife.

[England, Scotland.] Perennial. Summer.

Rootstock slender, creeping. Stem slender, decumbent at the base, then erect, flexuous, sparingly branched, 8 inches to 2 feet high. Leaves few, the lowest 1 to 2 inches long, and nearly as broad, somewhat panduriform, from the basal lobes projecting beyond the general outline of the leaf. Stipules large, scarious, pure white. Panicle very lax. Whorls few, remote, 3- to 5-flowered. Fruit petals $\frac{1}{4}$ inch in diameter, white tinged with pink, semitransparent. Nut $\frac{1}{8}$ inch long, oval, triquetrous, pale brown, smooth, shining. Plant intensely glaucous and very acid, the leaves fleshy and brittle.

French Sorrel.

French, *Patience à écussions.* German, *Schildblüttriger Ampfer.*

SPECIES XIV.—**RUMEX ACETOSA.** *Linn.*

PLATE MCCXXIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 2528.

Leaves rather succulent, the radical ones oblong or oval-oblong, deeply

sagittate, with the basal lobes subparallel or slightly diverging or even converging; lower stem leaves similar, but with shorter stalks; the upper ones narrower, sessile, amplexicaul. Ochreæ at length lacinate, not silvery, brownish. Branches of the panicle rather few, ascending-erect, leafless. Pedicels about as long as the fruit petals, articulated a little below the middle, spreading half-way round the stem. Flowers diœcious. Sepals reflexed from the fruit petals. Enlarged petals in fruit scarious and coloured, suborbicular, truncate-cordate at the base, rounded at the apex, entire, extending far beyond the nut, faintly reticulate, with a very minute scale-like tubercle at the base, without greatly thickened midribs. Leaves acid, green above, slightly glaucous beneath.

In meadows, pastures, open places in woods. Very common, and generally distributed.

England, Scotland, Ireland. Perennial. Spring, Summer.

Rootstock slender, tufted, scarcely creeping. Stem slightly curved at the base, then erect, 1 to 3 feet high, simple up to the panicle. Radical leaves on long stalks; lamina 1 to 3 inches long; lowest stem leaves few, generally with the lamina larger than the radical ones, 2 to 6 inches long. Female flowers 4 to 8 in a whorl: enlarged petals about $\frac{1}{5}$ inch long, generally tinged with crimson, especially round the margins; the sepals lying back along the petiole: nut $\frac{1}{10}$ inch long, elliptical, triquetrous, chestnut, smooth, shining. Panicle of male flowers denser than that of the female; sepals and petals herbaceous, with scarious white or red margins, not enlarging after flowering. Plant dull green; the leaves paler and somewhat glaucous below, frequently tinged with red in autumn.

The leaves are very variable in shape, but the lateral lobes are never divaricate, though sometimes they are separated by an obtuse, instead of acute angle.

Common Sorrel.

French, *Patience oseille*. German, *Sauer Ampfer*.

This plant is also known by the name of Greensauce, and is so common in all fields and waysides, that few people are unfamiliar with its appearance or pleasant acid taste. The leaves of the sorrel contain a considerable quantity of binoxalate of potash, which gives them their acid flavour and medicinal and dietetic properties. They have been employed from the most distant time as a salad, and on the Continent are still cultivated for that purpose. In the markets of Paris sorrel is nearly as abundant during the season as peas are in London. In this country the leaves are rarely eaten, unless by children and rustics, though in Ireland they are still largely consumed by the peasantry with fish and milk. Though the acid principle of the sorrel is in a large amount poisonous, the herb does not appear to be at all unwholesome, unless when eaten in very large quantities, as in some few recorded cases, when it has acted injuriously on children. In Scandinavia, according to Dr. Clarke, the plant has been used in times of scarcity to put in bread. The leaves contain a little starch and

mucilage, and the root is rather farinaceous. When dried, the roots, boiled in water, yield a fine red colour, which may be used as a dye. The juice of the leaves also will curdle milk, as well as rennet, and in some countries is used instead of it for that purpose. The salt of sorrel, binoxalate of potash, is much used for bleaching straw and removing ink stains from linen, and is often sold in the shops under the name of "essential salt of lemons." Its poisonous qualities are not commonly known, or doubtless it would often be substituted for oxalic acid. Dr. Taylor, in his work on Poisons, relates three cases of poisoning with this substance, two of which proved fatal. In one of the latter, a lady took by mistake half an ounce of the salts of sorrel, instead of cream of tartar. She had scarcely swallowed the draught, when she was seized with violent pain and convulsions, and died in eight minutes. The substance for which this poisonous salt is most likely to be mistaken is the bitartrate of potash, or cream of tartar. Lime water furnishes a ready means of distinguishing these two salts. It precipitates both of them white, but the precipitate from the bitartrate of potash is redissolved on adding to it a small quantity of a solution of tartaric acid, while that from the binoxalate is not redissolved. It may be as well to mention another simple means of distinction—the colour of ink is immediately discharged by warming it with a few grains of binoxalate, but is unaffected by the bitartrate of potash.

SPECIES XV.—**RUMEX ACETOSELLA.** *Lin.*

PLATE MCCXXIV.

Billot, Fl. Gall. et Germ. Exsicc. No. 2133.

Leaves rather thin, slightly succulent, the radical ones elliptical or oblong-elliptical or strapshaped-hastate, with the basal lobes long, widely diverging or divaricate, often curving towards the apex of the leaf, rarely absent; stem leaves similar but smaller and on shorter stalks; the uppermost ones sessile and amplexicaul. Ochreae laciniate, silvery. Branches of the panicle rather numerous, erect or ascending-erect, leafless. Pedicels about as long as the fruit petals, articulated immediately below the calyx, spreading half-way round the stem. Flowers diœcious. Sepals applied to the base of the fruit petals. Petals scarcely enlarged in fruit, subherbaceous, coloured, roundish oval, truncate-wedgedshaped at the base, obtuse, entire, not extending beyond the nut, not reticulated, without tubercles, but with the midribs slightly thickened at the base. Leaves acid, dull green, not glaucous.

On heaths, in meadows, pastures, waste places, cultivated ground, &c. Very common, and generally distributed.

England, Scotland, Ireland. Perennial Spring, Summer.

Rootstock creeping. Stems numerous, slender, generally decumbent at the base, than erect, 2 inches to 2 feet high, slightly branched or nearly simple up to the panicle. Radical leaves on long petioles; the lamina $\frac{1}{4}$ to 2 inches long, varying very much in breadth, generally

3-lobed, the central lobe increasing slightly in breadth towards the apex, the two lateral lobes shorter and commonly standing out at right angles to the middle lobe, sometimes with a projecting tooth on the basal side; stem leaves not much larger than the radical ones, the longest not measuring more than 3 inches. Ochreae at length much torn and silvery white. Panicles of male flowers larger than those of the female, the latter with 4 to 8 flowers in a whorl. Fruit petals about $\frac{1}{16}$ inch long, commonly red, but not membranous as in the two preceding species, closely adpressed to the nut, which is with difficulty extracted from them. Nut $\frac{1}{16}$ inch long, globular-trigonus, pale yellowish brown, smooth, shining; the faces are said, in the *Flore de France* (*Gren. & Godr.*), to be often tubercular, but I have never found them so after the petals have been removed. Plant dark green, often tinged with red in autumn.

Sheep's Sorrel.

French, *Patience petite oseille*. German, *Kleiner Ampfer*.

This species much resembles the former, but is altogether smaller and less active in its properties.

GENUS II.—OXYRIA. *Hill.*

Flowers perfect. Perianth herbaceous, of 4 segments in 2 rows, the 2 outer ones (sepals) not accrescent, the 2 inner ones (petals) becoming slightly larger and scarious and coloured in fruit, none of them with tubercles. Stamens 6: 4 of them in 2 pairs, opposite the external leaves of the perianth, the remaining 2 before the inner perianth leaves; anthers versatile, movable. Styles 2, exceedingly short; stigmas multifid. Fruit a lenticular broadly winged achene, much longer than the inner perianth leaves. Seed compressed; albumen copious, mealy; embryo situated in the axis of the albumen.

Small perennial plants with acid juice. The leaves almost all radical, roundish-reniform, and deeply cordate. Flowers in whorls arranged in racemes; which are generally combined into panicles.

The name of this genus of plants seems to be derived from the Greek word *ὀξύς* (*oxus*), sharp, in allusion to the qualities of the species.

SPECIES I.—OXYRIA RENIFORMIS. *Hook.*

PLATE MCCXXV.

O. digyna, *Campdera*; *Fries*, *Summ. Veg. Scand.* p. 52. *Koch*, *Syn. Fl. Germ. et Helv.* ed. ii. p. 710. *Gren. & Godr.* *Fl. de Fr.* Vol. III. p. 34.

Rumex digynus, *Linn.* *Sm. Engl. Bot.* No. 910.

Wing of the achene subcordate at the base, with a small narrow notch at the apex, entire on the margin.

On damp rocky ledges and by the sides of streams in mountainous districts, sometimes descending along the course of rivers into the low countries, but only when the source of the river lies in mountainous districts. Not uncommon in North Wales and the mountainous portion of the north of England. More frequent in the higher hills in the south of Scotland, and the Scotch Highlands, extending to the Hebrides and Orkney, though not recorded from Shetland. Rare in Ireland; found on the mountains in the south and west of that country.

England, Scotland, Ireland. Perennial. Late Summer, Autumn.

Rootstock somewhat woody, many-headed, so that the plant often grows in dense tufts. Radical leaves on very long petioles; the lamina roundish-reniform or subdeltoid-reniform, cordate or subhastate, rounded or retuse at the apex, entire or repand, and somewhat crisped at the margins, palmately veined, bearing some resemblance to the leaves of the Swiss *Rumex nivalis*, but on larger petioles, the lamina 1 to 3 inches across. Stem 4 to 18 inches high, nearly simple up to the panicle, leafless or with a leaf at the base of the first branch of the panicle. This leaf resembles the radical leaves, but is smaller, and with a shorter petiole. Panicle occupying the upper half of the stem, rather lax, slender; the branches with brown scarious entire ochreae at the base, leafless; fascicles 2 to 6-flowered. Pedicels very slender, about half as long again as the nut, jointed about the middle, thickened at the apex. Sepals 2, somewhat reflexed. Enlarged petals spatulate, $\frac{1}{8}$ inch long, somewhat coloured, with 3 to 5 diverging ribs, shorter than the wing of the nut. Nut surrounded by an orbicular wing which is as broad as the seed-cavity, and cordate or subtruncate at the base, with a notch with approximate sides at the apex extending through the wing down nearly to the body of the achene; the substance of the wing membranous, marked with radiating anastomosing veins, olive, usually with a crimson margin; the seed-cavity of the nut oval-lenticular, with a furrow on each side of the medial line. Plant rather dull green, often tinged with reddish in autumn, glabrous.

Kidney-shaped Mountain Sorrel.

GENUS III.—POLYGONUM. Linn.

Flowers perfect, rarely polygamous by abortion. Perianth coloured, rarely herbaceous, 5-cleft or 5-partite, rarely 4-cleft; segments slightly unequal, and generally increasing in size and covering the fruit. Stamens 5, 6, or 8, rarely 4 or 9, when 5 opposite to the perianth segments; anthers versatile, movable. Glands perigynous, or more rarely hypogynous, alternate with the stamens, more rarely absent. Styles 2 or 3, generally more or less united at the base, sometimes

very short; stigmas capitate. Fruit lenticular when there are 2 styles, or trigonous when there are 3, enclosed in the persistent perianth segments. Seed similar in shape to the achene; albumen copious, mealy or horny; embryo eccentric or axial, in the former case with the cotyledons narrow, in the latter with the cotyledons large and foliaceous.

Annual or perennial herbs, rarely undershrubs, with alternate, entire or serrulate leaves with ochreate stipules. Pedicels articulated. Flowers in the axils of ochreate bracts, arranged in spikes, or spikelike racemes, or panicles, generally pink or white.

The name of this genus of plants comes from two Greek words, *πολύς* (*polus*), many, and *γόνυ* (*gonu*), a joint, from the numerous joints or knots in the species.

SECTION I.—FAGOPYRUM. *Tournef.*

Stem branched, erect. Leaves triangular-ovate, cordate or hastate, palmately nerved. Flowers fasciculate, the fascicles arranged in terminal and axillary spikelike racemes disposed in a corymb or panicle. Perianth not accrescent. Stamens 8. Styles 3, free. Embryo axial; cotyledons broad, foliaceous, palmately nerved, crumpled.

SPECIES I.—**POLYGONUM FAGOPYRUM.** *Linn.*

PLATE MCCXXVI.

Fagopyrum esculentum, *Mönch*; *Meisn.* in *D.C. Prod.* Vol. XIV. p. 143. *Bab. Man.* Brit. Bot. ed. v. p. 286. *Fries*, *Summ. Veg. Scand.* p. 51.

Annual. Stem erect, branched. Leaves ovate-triangular, acuminate, cordate-sagittate or cordate-hastate, acute; the lower ones stalked, the uppermost sessile and amplexicaul. Ochreae obliquely truncate, not fringed. Flowers in lateral fascicles, arranged in short leafless stalked racemes combined into terminal and axillary corymbs. Pedicels about as long as the nut, recurved, articulated a little above the middle. Perianth petaloid, 5-partite, withering in fruit. Stamens 8. Styles 3, very short. Nut oval-triquetous, acuminate, longer than the perianth, smooth, dim, dark brown; the angles entire, not sinuated or winged. Plant not glandular.

In cultivated ground and waste places. Frequent in districts where it is cultivated, scarce elsewhere, but having no claims to be considered native, and not persistent in its stations.

[England, Scotland, Ireland.] Annual. Late Summer, Autumn.

Stem 9 inches to 2 feet high; branches spreading, absent in weak

specimens. Leaves 1 to 3 inches long, shaped somewhat like those of *Convolvulus Sepium*; the lower ones on long slender petioles; the upper ones also stalked, and 1 or 2 of the uppermost quite sessile. Racemes on short peduncles, arranged in a forked corymb. Flowers $\frac{1}{8}$ inch long, cream-coloured or pale pink. Nut about $\frac{1}{4}$ inch long, projecting much beyond the withered perianth; dark brown, with 3 very acute angles. Plant glabrous, with the veins of the leaves and a line on one side of the stem and peduncles commonly squamose-puberulent.

Common Buckwheat.

French, *Renouée Sarrasine*. German, *Buckweizen Knöterich*.

The specific name of this plant has been given it on account of the resemblance which the triangular seeds bear to beechmasts, and the English word for the plant has probably the same origin, being a corruption of the German *Buckweizen* (Buckwheat). Some, however, derive the common name from the plant being sown to afford food to deer, which is very improbable. The buckwheat has long been cultivated as an article of food in most parts of central and southern Europe, though originally a native of Asia. In this country it is known by the name of "Brank," and is grown chiefly as food for game, or for the sake of its green fodder. On some parts of the continent of Europe the ripe seeds are ground, and mixed with wheaten flour, and eaten as food. It is not much cultivated in Great Britain, the moist and variable climate not favouring its growth. One great advantage attending it is the very late period at which it may be sown, and the short time it takes to perfect its seed. It will not bear frost, and therefore should not be put into the ground before the first week in May, as the plants are always above ground five or six days after sowing. It requires little manure, and will often yield a good crop on poor or exhausted soils, on which nothing else will grow. The grain, which is small, black, and of a triangular form, is wholesome and nutritious, containing about 10 per cent. of gluten, and from 58 to 60 of starch, sugar, and gum. Given to cattle, it fattens them rapidly, while as a substitute for oats it answers well as food for horses. Poultry prefer it to any other grain, and all granivorous birds relish it exceedingly. A considerable quantity of the grain is annually consumed by the distillers, especially in the manufacture of gin. Beer may also be brewed from it nearly as well as from barley. Of late years, buckwheat has been brought into notice as a green manure, for which purpose it is said to answer admirably, but it must be thickly sown. It also furnishes in the green state excellent fodder for sheep and cattle, though it is said to have a narcotic effect on the former animals. As human food the grain is scarcely inferior to the cereal grasses. It does not make good bread, but is palatable, and probably wholesome in cakes and porridge. Peter the Great was so fond of it that he usually supped off a dish of buckwheat boiled and mixed with butter—a favourite way of preparing it at the present day. Buckwheat seems to have been unknown in Europe until about the time of the Crusades, when it was brought from the East by some of the hardy adventurers who returned from these expeditions. In memory of its origin as a plant of European culture, it is still called in France "*Blé Sarrasin*." By some writers it is said to have been first introduced into Spain by the Moorish conquerors at a much earlier period. Its cultivation rapidly spread in Europe, and it is now extensively grown throughout Germany, France, and Russia; in the latter country forming a staple food of the peasantry. In Belgium it is much grown as an ordinary rotation crop, and so highly

valued that, according to Bory de St. Vincent, the tomb of its first cultivator there was, in his time, still pointed out to strangers as that of a benefactor to his kind. Though scarcely worth ordinary cultivation in Britain, it is perhaps worthy of more attention in the drier parts of our island than it generally receives, especially on barren soils or lands recently reclaimed from heaths. As a green crop it has the advantage of not suffering from drought, remaining quite fresh long after the grass is everywhere burnt up. Bees are extremely fond of the flowers. In America, and some parts of Belgium, it is common to sow Buckwheat for the purpose of furnishing these insects with food, and many old writers recommend hives to be moved to the Buckwheat fields while crops are in full flower, as a certain means of increasing the quantity of honey.

SECTION II.—TINIARIA. *Meisn.*

Stem branched, almost always twining. Leaves ovate or triangular-ovate, cordate or hastate or very rarely truncate at the base, palmately veined. Flowers in axillary fascicles, or the fascicles arranged in terminal racemes or panicles. Perianth accrescent. Stamens 8. Styles 3, very short. Embryo lateral; cotyledons narrow, foliaceous, and flat.

SPECIES II.—POLYGONUM CONVULVULUS. *Linn.*

PLATE MCCXXVII.

Billot, Fl. Gall. et Germ. No. 1054.

Annual. Stem angular, twining or decumbent, branched. Leaves stalked, ovate or triangular-ovate, acuminate, cordate-sagittate or cordate-hastate, acute. Ochreae truncate, not fringed. Flowers in lateral fascicles of 3 to 6 (rarely more), combined into terminal and axillary simple interrupted spikelike-racemes, leafy at the base. Pedicels recurved, shorter than the nut, articulated near the apex. Perianth herbaceous, roughened, 5-partite, enlarged in fruit, when the 3 outer segments are bluntly keeled or rarely winged. Stamens 8. Styles 3, united for the greater part of their length. Nut oval-triquetrous or -trigonus, shagreened, opaque, black. Plant not glandular.

Var. α , *genuinum*.

PLATE MCXLIV.

Three outer segments of the perianth with blunt subherbaceous keels in fruit. Flowers 4 to 6 in each fascicle.

Var. β , *Pseudo-dumetorum*. *Wats.*

Three outer segments of the perianth with broad membranous wings in fruit. Flowers 5 to 10 in each fascicle.

In cultivated ground and waste places, where the soil has been recently disturbed, and in thickets and hedges. Common, and generally distributed. Var. β "in the garden of Williams's, Shanklin, and on the Dover at Ryde, Isle of Wight."—*Bromfield*.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem slender, wiry, twisted, climbing to the height of 2 or 3 feet or more when it has support; when growing without support decumbent, and seldom more than 1 foot long. Leaves 2 to 3 inches long, somewhat resembling those of *Convolvulus Sepium*, but more acuminate, and all of them stalked; the lower ones solitary; the upper ones often 2 or 3 together. Pedicels articulated immediately below the perianth. Perianth greenish, often tinged with red when in flower, usually dull green in fruit; segments with rather narrow white margins exactly covering and tightly enveloping the nut, the outer ones roughened and opaque, and keeled on the back. Nut $\frac{1}{6}$ to $\frac{1}{5}$ inch long, dull black, finely granulated all over with elongate points disposed lengthways. Plant dull green, nearly glabrous, with the veins and margins of the leaves and angles of the stem squamous-puberulent. When not climbing, the leaves often turn bright crimson in autumn.

Smith says the stamens are sometimes 6, and the styles only 2, but I have not seen any specimens in this state.

The var. β I have not seen: Dr. Bromfield says, it "is remarkable as uniting to the habit and general aspect of *P. Convolvulus* much of the character of *P. dumetorum*. . . . The perianth is almost as broadly winged as in my specimens of the true *P. dumetorum* from Wimbledon in Surrey, but the wings do not taper down so suddenly into the pedicel, and though it agrees with *P. dumetorum* in the elongation of the racemes, the somewhat greater length of the flower-stalks than is usual in *P. Convolvulus*, and the very distinct whorls of 5 to 10 or more flowers, it has not the slender and graceful appearance of that species."—*Fl. Vect.* p. 433.

Climbing Buckwheat.

French, *Renouée liscron*. German, *Windenartiger Knöterich*.

This is a frequent weed in corn-fields, producing seeds too small to be valuable as human food, but possessing equally nutritive qualities with those of the true Buckwheat, and is much relished by poultry and most wild birds. The small black triangular seeds of this plant are often found among oats, and sometimes in such quantities as to give a peculiar flavour to the meal, unless they are previously removed by sifting.

SPECIES III.—**POLYGONUM DUMETORUM.** *Linn.*

PLATE MCCXXVIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 843.

Annual. Stem round, twining, much branched. Leaves ovate or triangular-ovate, cordate-sagittate or cordate-hastate, acute, stalked.

Ochrcæ truncate, not fringed. Flowers in lateral fascicles of 3 to 6, combined into terminal and axillary simple interrupted spikelike racemes, leafy at the base. Pedicels recurved, longer than the nut, articulated near the middle. Perianth herbaceous, smooth, 5-partite, enlarged in fruit, when the 3 outer segments are furnished with broad scarious wings longly decurrent upon the pedicels. Stamens 8. Styles 3, united for the greater part of their length. Nut oval-triquetrous, nearly smooth, shining, black. Plant not glandular.

In hedges and thickets. Rare, and uncertain in its appearance. It has occurred in Somerset, Hants, Sussex, Surrey, Herts, and Monmouth, but Surrey seems to be its headquarters in Britain.

England. Annual. Late Summer, Autumn.

Very similar to *P. Convolvulus*, but a taller plant, generally 3 or 4 feet high, with more wiry stems, which have not raised lines upon them as in *P. Convolvulus*. The racemes are longer and the panicle is larger. The greatest difference, however, lies in the longer pedicels and the broad white scarious wing on the back of each of the 3 outer perianth segments: this wing is decurrent on the petiole, and gradually narrowed downwards, until it disappears altogether. The nut too is rather smaller than in *P. Convolvulus*, shining, and highly polished, instead of rough and opaque.

The variety β of *P. Convolvulus* approaches very closely to *P. dumetorum* in its winged perianth segments, but agrees with the typical *P. Convolvulus* in the angular stems and opaque nut.

Copse Buckwheat.

French, *Renouée des buissons*. German, *Hecken-Knöterich*.

SECTION III.—AVICULARIA. *Meisn.*

Stem branched, decumbent or more rarely erect. Leaves oblong-oval or elliptical, or strapshaped, not cordate or hastate. Flowers in axillary fascicles forming interrupted spikes or spikelike racemes. Perianth scarcely accrescent. Stamens 8, very rarely 5 or 6. Styles 3, very rarely 2. Embryo lateral; cotyledons narrow, foliaceous, flat.

SPECIES IV.—**POLYGONUM AVICULARE.** *Linn.*

PLATES MCCXXIX. MCCXXX. MCCXXXI.

Annual. Stem ascending or decumbent or prostrate, much branched. Leaves shortly stalked or the upper ones sessile, rather thin, flat, oval or oval-obovate or oblong or elliptical or strapshaped, attenuated at the base, obtuse or acute, entire, with the nerves indistinctly raised

beneath. Ochreæ brown at the base, with about six simple nerves, white and at length lacinate at the apex. Flowers in lateral fascicles of 2 to 4 or rarely solitary, combined into terminal simple or branched interrupted spikelike racemes leafy throughout; the lower fascicles so far separate that they scarcely form part of the spike. Pedicels erect, shorter than the nut, articulated immediately below the base of the perianth. Perianth coloured or subherbaceous, 5-partite, scarcely enlarged in fruit, subtruncate at the base; segments with a prominent dorsal nerve. Stamens 8. Styles 3, very short, free. Nut about as long as the perianth, ovate-triquetrous, striate-shagreened, dim or rather dim, chestnut or brown. Plant not glandular.

Common Knotgrass.

French, *Renouée des petits oiseaux*. German, *Vogel-Knöterich*.

FORM I.*—*Polygonum (aviculare) agrestinum*.

P. agrestinum. *Jord. Bor. Fl. du Centr. de Fr. Vol. II. p. 599. Norm. Trans. Tyneside Nat. Field Club, Vol. V. p. 142.*

P. aviculare. *Linn. Herb. (!).*

Stem suberect or ascending; branches spreading-ascending or diffuse. Leaves oval or elliptical-oval, subacute, about as long as the full-grown internodes. Ochreæ short, brown at the base, dull silvery white and at length lacinate at the apex. Perianth indistinctly veined, white or pale red. Nut rather shorter than the perianth, pale chestnut, dim. Plant yellowish green.

In corn-fields and cultivated ground. Common, and generally distributed.

England, Scotland, Ireland (?).† Annual. Late Summer, Autumn.

Stem 9 inches to 2 feet high, stiff, the central one longer than the others, and erect or ascending. Leaves 1 to 2 inches long; those at the extremity of the branches rather approximate, but those on the main stem, when the internodes have grown to their full length, about equal to them. Flowers shortly stalked, $\frac{1}{8}$ inch long, green, with the

* The *P. aviculare* of Linnæus probably includes several subspecies; but how many of the forms described be really hereditarily distinct, we have at present no means of knowing. I have not ventured, therefore, to term them subspecies, although throwing them into that form. Those enumerated here were first pointed out as British by the Rev. A. M. Norman in the fifth volume of the "Transactions of the Tyneside Naturalists' Field Club."

† I have not seen Irish specimens, but this form is so common, in England and Scotland, that it probably occurs in Ireland.

segments white with a greenish stripe on the back, sometimes with the margins tinged with rose colour. Nut about $\frac{1}{8}$ inch long, the point scarcely visible beyond the perianth. Plant light green, turning yellowish late in the year, the leaves with immersed pellucid dots, but no superficial glands.

FORM II.—*Polygonum (aviculare) vulgatum*.

PLATE MCCXXIX.

P. aviculare, *Boreau*, Fl. du Centr. de la Fr. Vol. II. p. 559. *Norm.* l. c. 142.

Stem ascending or prostrate; the branches spreading or diffuse. Leaves oval or obovate-oval, subobtusely, about as long as the full-grown internodes. Ochreæ rather short, reddish at the base, dull silvery white and at length lacinate at the apex. Perianth indistinctly veined, white or pale red. Nut about as long as the perianth, dark chestnut, slightly shining. Plant bright green.

By roadsides and in waste ground. Very common, and generally distributed.

England, Scotland, Ireland. Annual. Summer, Autumn.

Stems 3 inches to 2 feet long, more or less decumbent, with the internodes shorter than in *P. agrestinum*. The leaves are considerably shorter, $\frac{1}{2}$ to 1 inch long, more attenuated towards the base, more obtuse, and of much brighter and clearer green. The ochreæ are longer and more torn. The flowers are very similar, but rather smaller. The nut is about the same size as in *P. agrestinum*, but rather longer in proportion to the perianth, darker chestnut, and rather more shining, especially on the angles. The leaves vary considerably in breadth; the upper ones are narrow, but the lower are sometimes as broad as those of *P. agrestinum*, of which, however, I believe it to be merely a slight variety.

FORM III.—*Polygonum (aviculare) arenastrum*. *Bor.*

PLATE MCCXXX.

Billot, Fl. Gall. et Germ. Exsicc. No. 2733.

P. arenastrum, *Bor.* Fl. du Centr. de la Trans. Vol. II. p. 559. *Norm.* l. c. p. 143.

Stem decumbent or prostrate; the branches spreading, procumbent. Leaves oblong or oblanceolate-oblong, subobtusely or subacutely, longer than the internodes. Ochreæ short, brown at the base, dull silvery white and at length lacinate at the apex. Perianth indistinctly veined, white, very rarely tinged with pale red. Nut shorter than the perianth, dull chestnut, slightly shining. Plant bright green.

By roadsides in sandy districts. Common near London, in Surrey,

Kent, Essex, Cambridge, Suffolk, &c., but apparently less abundant in the north, although Mr. Norman first noticed it at Seaham in Durham. I have not seen Irish specimens, but have found it at North Berwick and Haddington.

England, Scotland. Annual. Late Summer, Autumn.

Stems 3 inches to 1 foot long, usually prostrate, and with very short internodes. The leaves, especially at the extremity of the branches, are quite crowded together, the longest not more than $\frac{1}{2}$ inch long, and frequently smaller. Flowers not more than $\frac{1}{10}$ inch long, green, with the segments white, tinged with green. The nut tapers more gradually than in the two preceding forms, but it is quite probable that its peculiarities are merely the consequence of the circumstances of its growth.

FORM IV.—**Polygonum (aviculare) microspermum.** *Jord.*

P. microspermum, *Jord. Bor. Fl. du Centr. de la Fr. Vol. II. p. 560. Norm. l. c. p. 142.*

Stem slender, prostrate; the branches spreading or ascending. Leaves oblong or strapshaped-oblongate, about as long as the internodes. Ochreae very short, brown, silvery white and at length lacinate at the apex. Perianth indistinctly veined, red, rarely white, very small. Nut rather longer than the perianth, dark chestnut, quite opaque.

In sandy places. Apparently rare. Mr. Norman records it from Stockton-on-Tees, Durham; Mr. J. G. Baker has found it at Hartley in Northumberland; and I have specimens from the Rev. W. W. Newbould, labelled from "Jersey," and from Mr. H. C. Watson, collected between Weybridge town and railway station.

England. Annual. Late Summer, Autumn.

Stems very slender. Leaves $\frac{1}{4}$ to $\frac{1}{2}$ inch long. Flowers solitary or in pairs. Perianth little more than $\frac{1}{12}$ inch long, with the point of the nut projecting slightly beyond it. The nut itself not above $\frac{1}{10}$ inch long, dark coloured, and very dim.

As I have not seen this form alive, I am unable to say what colour its foliage may be, and I have seen too few specimens to venture to give any opinion as to its claims to be considered a subspecies, though its very small flowers and nuts may perhaps entitle it to be considered distinct from the other forms of *P. aviculare*.

FORM V.—*Polygonum (aviculare) rurivagum.* Jord.

PLATE MCCXXXI.

P. rurivagum, Jord. Dor. Fl. du Centr. de la Fr. Vol. II. p. 560. Norm. 1. c. p. 141.

Stem erect; branches spreading-ascending or erect at the apex. Leaves elliptical or strapshaped-elliptical, about as long as the internodes, very acute. Ochreæ very long, brown at the base, shining silvery white and at length laciniate for the greater part of their length. Perianth strongly veined in fruit, green, with the margins of the perianth segments bright crimson, occasionally crimson all over. Nut a little longer than the perianth, reddish chestnut, slightly shining, especially on the angles. Plant greyish green.

In corn-fields. Common in sandy and chalky districts in Kent, Surrey, Essex, and Norfolk. I have it also from Warwickshire and Durham.

England. Annual. Late Summer, Autumn.

A handsome plant, which I believe to be distinct as a subspecies, as it frequently grows intermixed with *P. agrestinum*, without intermediate forms. Stems 1 to 2 feet high, slender, with elongated internodes. The ochreæ are much longer than in any of the preceding. Leaves 1 to 2 inches long, much less spreading, and more attenuated at each extremity than in the forms previously described. Flowers generally 2 or 3 together, $\frac{1}{8}$ inch long, more or less tinged with very bright crimson. Nut with the point usually projecting beyond the perianth. Plant of a much less lively green than in the common forms, and with much the aspect of the continental species *P. arenarium* and *P. Bellardi*.

FORM VI.—*Polygonum (aviculare) littorale.* Link.

P. littorale, "Link," Meisn. in D.C. Prod. Vol. XIV. p. 98 (non Gren. & Godr.).

Stem prostrate; branches prostrate or ascending at the apex. Leaves oblong-elliptical or oblong, shorter than the full-grown internodes, subacute, rather thick, and somewhat fleshy. Ochreæ rather short, brown at the base, dull silvery white, and at length laciniate at the apex. Perianth rather strongly veined in fruit, green, with the margins of the perianth segments bright crimson, occasionally bright crimson all over. Nut a little longer than the perianth, chestnut, slightly shining, especially on the angles. Plant deep dull green.

On sands, waste ground, and loose shingle by the sea. Probably

not uncommon, but I have specimens only from Kent, Essex, and Yorkshire.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem with very numerous long straggling branches spreading in a circle; internodes rather long, except at the apex of the branches. Leaves $\frac{1}{2}$ to 1 inch long, thicker and more fleshy than in any of the preceding forms, not spreading; those in the axils of which flowers are produced short, rarely above $\frac{1}{2}$ inch long. Perianth $\frac{1}{6}$ inch long, more or less tinged with bright crimson. Nut less deeply sculptured, and more shining than in any of the preceding forms.

This plant resembles *P. Raii*, but the nut is considerably shorter, and not smooth and shining as in that species. I believe that it may prove distinct as a subspecies from the other forms of *P. aviculare*.

SPECIES V.—**POLYGONUM RAIL.** *Bab.*

PLATE MCCXXXII.

P. littorale, *Gren. & Godr.* Fl. de Fr. Vol. III. p. 51.

P. Roberti (*Loisel, ex parte*), *Hook. & Arn.* Brit. Fl. ed. vi. p. 354.

P. maritimum, var. *Benth.* Handbk. Brit. Fl. ed. ii. p. 398.

Annual or biennial. Stem herbaceous, prostrate, usually branched. Leaves shortly stalked or the upper ones sessile, rather thin, flat when full-grown, but with the margins reflexed when young, oval or oblong-elliptical or strapshaped-elliptical, entire, attenuated at the base, acute or subacute, with the nerves distinctly raised beneath. Ochreae brown at the base, with about 6 thin simple nerves, silvery white and at length lacinate at the apex. Flowers in lateral fascicles of 2 to 6, or rarely solitary, combined into terminal simple interrupted spikelike racemes leafy throughout; the lower fascicles so far separated that they scarcely form part of the spike. Pedicels erect or slightly recurved, about as long as the nut, articulated immediately below the base of the perianth. Perianth coloured or subherbaceous, scarcely enlarged in fruit, attenuated at the base; segments with a prominent dorsal nerve. Stamens 8. Styles 3, very short, free. Nut about half as long again as the perianth, ovate-triangular, smooth or nearly smooth, chestnut or pale chestnut. Plant not glandular.

On sandy seashores. Rather rare, though generally distributed round the south and west coasts of England, and the south-west of Scotland, extending north to Argyleshire. Rare on the east coast, where, however, it has occurred in Kent, Norfolk, Lincoln, Haddington, Fife, and probably Forfar. It has been reported from Shetland,

but this requires confirmation. In Ireland it is not unfrequent, and is found all round the island.

England, Scotland, Ireland. Annual or Biennial. Summer, Autumn.

Very similar to the form *littorale* of *P. aviculare*, but usually with the leaves more approximate, the ochreae broader and more funnel-shaped, the silvery portion longer and very conspicuous towards the apex of the branches. Leaves $\frac{3}{4}$ to $1\frac{1}{2}$ inch long, variable in breadth; the specimens I have seen from the east coast having them strapshaped-elliptical and acute, while in Irish and Jersey specimens they are oval-elliptical and subacute, in all cases making no great angle with the stem, and those at the extremity of the branches nearly erect. The flowers are usually 3 together. Perianth $\frac{1}{2}$ inch long, usually green; the segments with red, more rarely rose colour or white, margins, sometimes crimson throughout. Nut with the point projecting far beyond the perianth, highly polished, and appearing shagreened only under a powerful lens: this is the only certain distinction between this plant and *P. aviculare*. The plant is pale green, sometimes slightly glaucous.

Mr. Bentham appears to consider this rather a young and luxuriant state than a variety of *P. maritimum*, but I have often seen the full-grown stem in autumn only 3 inches long, when the plant was neither young nor luxuriant. Mr. H. C. Watson has cultivated *P. Raii* and *P. maritimum*, and found them remain distinct.

On the east coast of Scotland this plant is always annual, but in the south and west it seems to be biennial, possibly even perennial.

Ray's Knotgrass.

SPECIES VI.—**POLYGONUM MARITIMUM.** *Linn.*

PLATE MCCXXXIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 632.

Annual, biennial, or perennial. Stem herbaceous, or in old plants woody at the base, branched. Leaves shortly stalked or the upper ones sessile, coriaceous, with reflexed margins, oval or oblong-oval or oblong-elliptical, entire, attenuated at the base, subacute, with the veins distinctly raised beneath. Ochreae chestnut at the base, with 6 to 12 strong generally forked nerves, silvery white and at length lacinate at the apex. Flowers in lateral fascicles of 2 to 4, or rarely solitary, combined into terminal simple interrupted spikelike racemes, leafy throughout, the lower fascicles so far separate that they scarcely form part of the spike. Pedicels erect, usually a little longer than the nut, articulated immediately below the base of the perianth. Perianth coloured or subherbaceous, scarcely enlarged in fruit, attenu-

ated at the base; segments with a prominent dorsal nerve. Stamens 8. Styles 3, very short, distinct. Nut about half as long again as the perianth, ovate-triquetrous, smooth, chestnut or pale chestnut. Plant not glandular.

On sandy seashores. Very rare, and perhaps extinct in England. It used to grow at Muddiford, near Christchurch, Hants, where it was collected by Mr. Borrer as late as 1847, but it is said now to be extinct there. I have received, through the Botanical Society of Edinburgh, a specimen labelled from Bognor, Sussex, collected by Professor Balfour. In the Channel Islands it is much more plentiful, occurring at Grand Havre, in Guernsey, St. Ouen's Bay, Jersey, and in Herm.

England. Annual, Biennial, or Shrub. Summer, Autumn.

Very like *P. Raii*, at least the herbaceous-stemmed forms are so, and these are the only ones I have seen from Britain or the Channel Islands, but the leaves are much thicker in texture, with revolute margins, and decidedly glaucous. The ochreae are larger, those towards the apex of the branches as long as or longer than the internodes, their base is more chestnut, and of thicker texture, the veins are much more numerous and some of them forked: the increased number of veins is doubtless produced by their forking close to the base, as in some ochreae there are only 6 veins, forked a little above the base, while in others there appear to be 12, which are distinct until they lose themselves in the stem. The perianth segments are broader and more obovate than in *P. Raii*, but otherwise very similar. The nut is undistinguishable from that of *P. Raii*.

Sea Knotgrass.

French, *Renouée maritime*.

SECTION IV.—PERSICARIA. *Meisn.*

Stem branched (rarely nearly simple), erect or decumbent. Leaves lanceolate or elliptical, attenuated at both ends. Flowers in fascicles arranged in terminal spikelike racemes, which are often in pairs or disposed in panicles. Perianth scarcely enlarged in fruit. Stamens 4 to 8. Styles 3 or 2. Embryo lateral; cotyledons narrow, foliaceous, flat.

SPECIES VII.—**POLYGONUM HYDROPIPER.** *Linn.*

PLATE MCCXXXIV.

Billot, Fl. Gall. et Germ. Exsicc. No. 72.

Annual. Stem geniculate at the base, and rooting at the lower nodes, then erect; rarely erect from the base, slightly swollen at the nodes,

much branched. Leaves shortly stalked, the upper ones subsessile, narrowly lanceolate or elliptical-lanceolate. Ochreæ subventricose, ciliated with long and short weak bristles, and floral ones usually not ciliated. Racemes spike-like, solitary at the extremity of the stem and branches, racemosely or subpaniculately arranged, long, slender, lax, interrupted, leafy only at the base, flexuous, at length generally with the apex pendulous. Pedicels about as long as the nut, articulated immediately below the perianth, without glands. Perianth subherbaceous, studded all over with conspicuous glands, without prominent nerves. Stamens 6, rarely 8. Styles 2 or 3, free nearly to the base. Nut of the 2-styled flowers ovate plano-convex, shagreened, with raised points, dim black, those of the 3-styled flowers bluntly trigonous. Leaves beneath and ochreæ dotted with minute glands. Plant acrid.

In wet places, particularly by ditches and in hollows filled with water in winter. Common, and generally distributed in England and the south of Scotland, but becoming much scarcer in the north of Scotland, where it is absent from many of the counties. Common throughout Ireland.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 9 inches to 3 feet high, branched principally at the lower nodes, from which branches nearly equalling the main stem are commonly produced; the lower part of the stem geniculate when growing in wet places, and producing tufts of root-fibres from the lower nodes. Leaves (inclusive of the short petioles) 2 to 4 inches long, slightly undulated; the petioles dilated at the base; the margins serrulate, with short bristles pointing towards the apex. Ochreæ rather large, wide, brown, truncate, and fringed with a few bristles, those from which flowers are produced usually destitute of bristles. Spikes 3 to 9 inches long, very lax, shorter and rather flexuous when the plant is growing in dry ground, very long, arched, and hanging over in luxuriant specimens growing in wet places; fascicles of which the spike is composed 2- or 3-flowered, the lower ones remote, and with leaves at the base of their ochreæ, the upper ones surrounded by ochreæ, but without leaves. Perianth $\frac{1}{5}$ inch long, green, tinged with pale rose, dotted with large glands, which are at first impressed and green, but afterwards prominent and reddish-brown. Nut $\frac{1}{6}$ inch long, black, the greater number of them much compressed, the rest trigonous. Plant pale green, the stems and lower leaves often tinged with lurid purple late in the season.

Water Pepper.

French, *Renouée poivre d'eau*. German, *Wasserpfeffer*.

This plant possesses very acrid qualities, and is hot and biting to a degree, so that no animal will eat it, even insects avoid it; and it is said that when dried and laid

amongst clothes no moth will touch them. Its bruised leaves are still used in villages instead of a mustard poultice, and they are put into the mouth to cure tooth-ache. It is said to be a powerful diuretic, and a water distilled from it was formerly used in some nephritic complaints. A decoction of this plant will dye wool of a good yellow colour, if the material is first dipped in a solution of alum.

SPECIES VIII.—**POLYGONUM MINUS.** *Huds.*

PLATE MCCXXXV.

Billot, Fl. Gall. et Germ. Exsicc. No. 2358.

Annual. Stem commonly geniculate and rooting at the base, then erect and ascending, slightly smaller at the nodes, branched. Leaves sessile, narrowly-lanceolate or elliptical-strapshaped or strapshaped. Ochreae rather tight, all ciliated with long and short weak bristles. Racemes spike-like, solitary at the extremity of the stem and branches, racemously or racemoso-paniculately arranged, rather short, slender, lax, interrupted and leafy at the base, continuous and leafless at the apex, straight, erect or ascending. Pedicels about as long as the nut, articulated immediately beneath the perianth, without glands. Perianth coloured, sprinkled with very minute pale glands towards the base only, without prominent veins. Stamens 5. Styles 2' or 3, combined half-way up. Nut of the 2-styled flowers ovate, plano-convex, nearly smooth, shining; those of the 3-styled flowers bluntly trigonous. Leaves destitute of superficial glands, ochreae glabrous, except at the base. Plant insipid.

In marshes and wet places, especially in shallow drains. Rather scarce and local, but generally distributed throughout England. In Scotland apparently confined to Loch Moss, Dumfries. Generally distributed, but rare in Ireland.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 3 to 18 inches long, usually more or less decumbent, branched, principally from the base, as in *P. Hydropiper*. Leaves much narrower than in that species, with scarcely any stalk, and with the broadest part a little nearer the middle of the leaf; the longest 1 to 2 inches long, bristly-serrulate, as in the preceding species. Ochreae rather small, membranous, the floral ones ciliated like the lower ones and often purple. Perianth $\frac{1}{8}$ inch long, white or rose. Nut $\frac{1}{10}$ inch long, and consequently much smaller than that of *P. Hydropiper*, from which it also differs in being shining, and scarcely at all shagreened. Plant pale green. The perianths and ochreae are usually described as destitute of glands; but in all the recent specimens I have examined I have found on their base numerous very minute pale meal-like glands; there

are certainly never large fovea-like glands as on the perianth P. *Hydropiper*.

Small Persicaria.

French, *Renouée fluette*. German, *Kleiner Knöterich*.

SPECIES IX.—**POLYGONUM MITE.** *Schrank.*

PLATE MCCXXXVI.

Billot, Fl. Gall. et Germ. Exsicc. No. 1064.

P. dubium, *Stein.* *Gren. & Godr.* Fl. de Fr. Vol. III. p. 48.

Annual. Stem erect, sometimes geniculate and rooting at the very base, slightly swollen at the nodes, branched. Leaves subsessile, elliptical or lanceolate-elliptical. Ochreae rather loose, all ciliated with long and short weak bristles. Spikes solitary (rarely in pairs) at the extremity of the stem and branches, racemose or racemoso-paniculate, long, slender, lax, interrupted and leafy at the base, contiguous and leafless at the apex (rarely wholly contiguous and leafless), straight, erect or ascending. Pedicels about as long as the nut, articulated immediately below the perianth, without glands. Perianth coloured, without glands or prominent veins. Stamens 5, rarely 6. Styles 2 or 3, combined half-way up. Nut as long as the perianth; that of the 2-styled flowers roundish-oval, plano-convex, faintly shagreened, shining; those of the 3-styled flowers bluntly trigonous, compressed. Leaves and ochreae without superficial glands. Plant insipid.

In wet places, especially by the sides of rivers; local, but probably often passed over as *P. Persicaria*. It is common in Surrey by the Thames and its tributaries, and it certainly occurs in Middlesex, Essex, Cambridge, Hunts, Northampton, and Yorkshire. It appears to be absent from both Scotland and Ireland.

England. Annual. Late Summer, Autumn.

Stem 1 to 2 feet high, and with more virgate branches than in any of the preceding species of the section *Persicaria*. Leaves, inclusive of the very short petiole, 2 to 4 inches long, serrulated with rather longer bristles than in *P. minus* and *P. Hydropiper*. Ochreae membranous, white, ciliated in the same manner as the two preceding species, the floral ones often purplish. Spikes thicker than in *P. minus* and *P. Hydropiper*, 1 to 4 inches long; in the latter case with the lower whorls much separated, and 1 or 2 of them having a leaf at the base. Perianth $\frac{1}{2}$ inch long, pale rose or white, often tinged with green. Nut $\frac{1}{2}$ inch long, appearing shagreened under a lens, but distinctly

shining, pitchy black. Plant bright green, the leaves sometimes turning purplish or red in autumn. The much larger fruit is sufficient to distinguish small specimens of *P. mite* from large ones of *P. minus*.

Lax-flowered Persicaria

German, *Milder Knöterich*.

SPECIES X.—**POLYGONUM PERSICARIA.** *Linn.*

PLATES MCCXXXVII. MCCXXXVIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1063.

Annual. Stem erect or ascending, sometimes geniculate and rooting at the very base, more or less swollen at the nodes, branched. Leaves shortly stalked, elliptical or lanceolate-elliptical. Ochreae rather loose, all strongly fringed with rather short weak bristles. Spikes oblong or cylindrical, solitary or in pairs at the extremity of the stem and branches, racemose or racemoso-paniculate, short, dense, thick, contiguous, or more rarely elongate, and rather thin, lax at the base, sometimes leafless or with a single leaf at the base, straight, erect or slightly drooping. Peduncles glabrous, rarely with a few inconspicuous glands; pedicels shorter than or equalling the nut, articulated immediately below the perianth, without glands. Perianth coloured, without glands, or with a very few minute ones, generally without prominent veins. Stamens 6. Styles 2 or 3, combined half-way up. Nut rather longer than the perianth; those of the 2-styled flowers ovate-roundish, plano-convex, very finely shagreened, shining; those of the 3-styled flowers bluntly trigonous, not compressed, with the 3 faces round; sometimes all the flowers 2-styled and with flat nuts. Leaves with minute dots, but no superficial glands; ochreae not glandular.

Var. *α*, *genuinum*

PLATE MCCXXXVII.

Stem slightly enlarged at the nodes. Ochreae rather tight. Spikes not agglomerated even when young; in fruit oblong, short, dense. Pedicels shorter than the nut.

Var. *β*, *elatum*. *Gren. and Godr.*

PLATE MCCXXXVIII.

P. biforme, *Wahl.* *Fries*, Mant. ii. p. 28.

P. nodosum, *Pers.*, *Meisn.* in *D.C.* Prod. Vol. XIV. p. 118 (?) (Excl. Syn.):

Stem generally enlarged at the nodes. Ochreae loose. Spikes when young agglomerated into a thyrus; in fruit cylindrical, elongate,

rather lax, sometimes slightly drooping. Pedicels as long as the nut. Plant usually much larger than in var. α .

Var. α in damp places and by the sides of ditches, in meadows and cultivated ground. Very common, and generally distributed. Var. β rare. In cultivated ground and wet places. I have only seen it from Battersea Fields, and elsewhere about the neighbourhood of London.

England, Scotland, Ireland. Annual. Summer, Autumn.

Var. α has the stem 9 inches to 2 feet high, generally red, more rarely spotted. Leaves 2 to 4 inches long, attenuated at each end, but sometimes rather more towards the apex than the base. Spikes $\frac{1}{2}$ to $1\frac{1}{2}$ inch long, the terminal ones stalked, often in pairs of unequal length, the axillary ones stalked or sessile, solitary. Perianth about $\frac{1}{6}$ inch long, bright rose, more rarely pure white. Nut $\frac{1}{6}$ inch long, appearing punctured only under a strong lens, black, very shining, the greater number of nuts compressed, but always a few with 3 blunt edges. Leaves green, generally with a black blotch in the middle of the upper surface, usually minutely pubescent beneath, sometimes quite hoary with short cottony hairs. Pedicels sometimes slightly hairy, but almost always destitute of glands. Flowers of a brighter red or purer white than any of the other species of the section *Persicaria*, except *P. amphibium*, which has the rose colour much paler. The dense continuous spikes distinguish this from the *P. mite*, which in other respects it resembles.

Var. β is a much larger plant, so like some of the varieties of *P. lapathifolium* that it is only by observing the absence of conspicuous glands on the peduncles, perianth, and leaves, and the plano-convex nuts, that it can be distinguished from the latter. Spikes 1 to 2 inches long, lax. The stem is much more enlarged at the nodes than in var. α ; the ochreæ shorter and wider; the leaves broader in proportion, sometimes 6 inches long. Perianth often dull pink or flesh colour, though sometimes as bright as that of the more common form.

This appears to be the *P. nodosum* of Persoon and Meisner, and all those botanists who refer that name to a plant allied to *P. Persicaria* rather than to *P. lapathifolium*.

Spotted Persicaria.

French, *Renouée persicaire*. German, *Gemeiner Knöterich*.

SPECIES XI.—*POLYGONUM LAPATHIFOLIUM*. Linn.

PLATES MCCXXXIX. MCCXL.

Annual. Stem erect or ascending, sometimes geniculate and rooting at the very base, greatly swollen and branched. Leaves lanceolate or elliptical-lanceolate or ovate-lanceolate, shortly stalked. Ochreæ rather loose; the lower ones not ciliated, the upper ones generally fringed

with short hairs, and so obliquely truncate as to form a point at one side. Racemes spikelike, oblong or cylindrical, erect or drooping, solitary or in pairs at the extremity of the stem and branches, paniculate or racemoso-paniculate, short or elongate, dense or lax, continuous, rarely interrupted at the base, almost always leafless at the base. Peduncles rough with small yellowish glands; pedicels shorter than the nut, articulated immediately below the perianth with a few small yellow glands. Perianth coloured, sprinkled with minute yellow glands, and with rather prominent veins in fruit. Stamens 6. Styles 2, free nearly down to the base. Nut a little longer or a little shorter than the perianth, suborbicular, acuminate into a short point, much compressed, concave on each face, very finely shagreened, shining. Leaves with minute dots and remote small yellow superficial glands beneath; ochreæ furnished with similar glands.

Var. α , *genuinum*.

PLATE MCCXXXIX

P. lapathifolium, *Auct. Plur.*

Upper ochreæ indistinctly ciliated, and with a long point; lower and middle ochreæ not ciliated. Spikes when young not agglomerated into a thyrus, in fruit oblong or ovoid-oblong, very dense, erect or slightly drooping. Perianth rather shorter than the nut, strongly veined, greenish white, rarely dull pink.

(?) Var. β , *nodosum*.

PLATE MCCXL.

P. nodosum, *Reich. et Auct. Plur.* (non *Pers.*?).

P. laxum, *Reich. Bab. Engl. Bot. Supp. No. 2822.*

Upper ochreæ distinctly ciliated, and the lower ones generally indistinctly so. Spikes when young agglomerated into a thyrus; in fruit oblong or cylindrical, dense or rather lax, generally drooping. Perianth longer than the nut, rather strongly veined, generally red or flesh colour. Nut about half the size of that of var. α .

In cultivated ground, wet and waste places. Var. α very common, and generally distributed throughout the three kingdoms. Var. β rather rare, but widely distributed in England; rare in Ireland, and perhaps erroneously recorded from thence.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Var. α , the typical and more common form, has the nuts consider-

ably larger than in *P. Persicaria*, about $\frac{1}{6}$ inch long, and doubly concave; the perianth strongly veined with hooked veins, and is usually of a dull greenish white, more rarely slightly tinged with rose colour. The styles are distinct for a greater part of their length, and are longer than those of *P. Persicaria*. The leaves are generally marked with a black blotch, and are very often clothed with short cottony hairs beneath, and scattered ones above; the nerves on the under side strigosely hairy. Mr. Watson found a curious form in Guernsey with the leaves nearly as broad as long.

Var. β has very much the aspect of the var. *elatum* of *P. Persicaria*, but is always readily distinguishable by the conspicuous glands on the peduncles, pedicels, perianth, and leaves, except when the latter are clothed with white woolly hair beneath, in which case the glands are not visible. The perianth also is more strongly veined, and the nut is broader, shorter, and concave on each face. None of the flowers, so far as I have seen, have 3 styles, and consequently there are no 3-sided nuts. I do not see how it can be separated from var. α , even as a subspecies.

Glandular Persicaria.

French, *Renouée à feuilles de patience*. German, *Ampferblättriger Knöterich*.

SPECIES XII.—**POLYGONUM AMPHIBIUM.** *Linn.*

PLATES MCCXLI. MCCXLII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1061.

Perennial. Rootstock rather slender, woody, branched, and extensively creeping. Stem erect (or swimming), simple, or sparingly branched. Leaves, when the plant is terrestrial, shortly stalked, oblong-strapshaped or lanceolate-strapshaped, rounded or subcordate at the base, attenuated towards the apex, acute: but when the plant is aquatic, the leaves have conspicuous stalks, are broader, generally more cordate at the base, much less attenuated towards the apex, and float on the surface of the water. Ochreæ rather tight, not fringed, or sometimes apparently so, in the terrestrial form, from the hairs which clothe them projecting beyond the margins. Racemes spikelike, cylindrical or oblong, erect, solitary or in pairs at the extremity of the stem, sometimes with 1 or 2 racemosely arranged beneath the terminal one, dense, continuous, not interrupted or leafy at the base. Peduncles usually hairy, without glands; pedicels shorter than the nut, articulated immediately below the perianth, without glands. Perianth coloured, without glands or prominent veins. Stamens 5. Styles 2, united half-way up. Nut (rarely matured), much shorter than the perianth, roundish-ovoid, abruptly pointed, doubly convex, finely shagreened, shining. Leaves rough with very short stiff hairs in the terrestrial

form; nearly smooth when growing in marshes: and quite smooth when growing in water, with minute raised dots but no superficial glands beneath.

In waste places, cultivated fields, and by roadsides; also in marshes, ponds, and ditches. Common, and generally distributed.

England, Scotland, Ireland. Perennial. Late Summer, Autumn.

This plant presents two very distinct aspects, according to its place of growth. When growing in dry places the stem is 1 to 3 feet high, usually simple, or with short branches in the axils of the leaves; the leaves have short stalks, $\frac{1}{4}$ to 1 inch long; and laminae 3 to 18 inches long, generally very rough to the touch, though sometimes, when growing in marshy places, nearly smooth; the ochreae are generally clothed with hairs; the spikes are $\frac{3}{4}$ to $2\frac{1}{2}$ inches long, and the fruit appears very rarely to attain to maturity. In the aquatic form, the length of the stem depends on the depth of the water, as the flower always rises above the water; the leaves are coriaceous and float on the surface; the petioles are 1 to 3 inches long; the lamina somewhat resembles that of *Potamogeton natans*, but is narrower and more parallel-sided, the length varies from 2 to 5 inches, and the surface is destitute of hairs, as are also the ochreae; the spike is not above 1 to $1\frac{1}{2}$ inch long, thicker in proportion, and often perfects its fruit. In both forms the bracts are acuminate or cuspidate, scarious brown, surrounding the fascicles, but not the rachis. The perianth is $\frac{1}{2}$ inch long, pale bright rose. Stamens exserted. Nut $\frac{1}{8}$ inch long, dark chestnut, with difficulty separated from the perianth. When growing in dry places, the plant frequently does not flower.

Amphibious Bistort.

French, *Renouée amphibie*. German, *Ortwechelnder Knöterich*.

Dr. Withering says, "Water fowls are said by Curtis to be fond of the seeds. Greville designates the plant a mischievous weed."

SECTION V.—BISTORTA. *Tournef.* (non *Meisn.*).

Stems unbranched, erect. Leaves chiefly radical, ovate, oblong or lanceolate, often waved at the edges. Flowers in a solitary terminal spikelike raceme or spike. Perianth not accrescent. Stamens 8. Styles 3, elongate. Embryo lateral; cotyledons narrow, foliaceous, flat.

SPECIES XIII.—**POLYGONUM BISTORTA.** *Linn.*

PLATE MCCXLIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 2357.

Perennial. Rootstock slender, woody, rather extensively creeping, much branched; the branches terminating in enlarged tubers, gene-

rally bent into an S-curve. Stem erect, quite simple. Radical leaves on long stalks, ovate, truncately or subcordately constricted at the base and then decurrent on the petiole, obtuse or subobtuse; stem leaves similar to the radical leaves, but much smaller, narrower, more acute, and on shorter stalks, the uppermost one subsessile. Ochreæ not fringed. Raceme spikelike, oblong-cylindrical or oblong, erect, solitary at the extremity of the stem, dense, continuous, not interrupted or leafy at the base. Peduncles not glandular, smooth; pedicels scarcely as long as the nut, articulated immediately below the perianth, without glands. Perianth pale rose colour, without glands, and with the veins slightly prominent in fruit. Stamens 8. Styles 3, free to the base. Nut a little longer than the perianth, oval-obovate, triquetrous, abruptly pointed, smooth, shining. Leaves glaucous beneath.

In woods and meadows. Rather scarce, but generally distributed over England and the south of Scotland. North of the Forth and Clyde it is probably an introduced plant, though perhaps it may be native in the Isle of Skye. Very rare, but widely distributed in Ireland.

England, Scotland, Ireland. Perennial. Early Summer.

Rootstock with enlargements at the apex of the branches resembling the tubers of *Arum maculatum* in shape, but of a dark chestnut colour, fleshy and pink within. Stem 1 to 2 feet high. Radical leaves numerous, on stalks 3 inches to nearly a foot long; lamina 3 to 8 inches long, resembling that of *Rumex obtusifolius*, but with a decurrent strip running a short way down each side of the petioles, with slightly undulated margins, not revolute when full-grown; veins deeply impressed on the upper surface and prominent beneath; stem leaves few, rapidly diminishing in size upwards. Ochreæ very long, extending beyond the base of the leaf on the side of the stem opposite to it. Racemes dense, 1 to 2 inches long, with scarious brown bracts not surrounding the rachis, terminating in long cuspidate points. Perianth $\frac{1}{6}$ inch long, pale rose or flesh colour. Stamens much exserted. Styles exserted or included. Nut $\frac{1}{6}$ inch long, brown, highly polished. Plant deep green, the leaves slightly shining above, glaucous and pubescent on the veins beneath.

Common Bistort.

French, *Renouée bistorte*. German, *Wiesen Knöterich*.

The Bistort is common in fields and meadows where the soil is moist, especially in the northern counties. It is perennial, with a creeping root, which rapidly spreads itself in favourable situations, and renders the plant a noxious and troublesome weed in low pastures. The common name of the Bistort is Snakeweed, or Patience Dock, and if we may believe that it effected a hundredth part of the cures which are attributed

to it, we might welcome its presence in our pastures. The leaves were at one time thought to render any who drank a decoction of them safe from all infection, even the plague. The root contains a large quantity of tannin, which renders it highly astringent. This property gave rise to its medicinal reputation, and it is even now regarded by some as a valuable remedy in hæmorrhage and diarrhœa, and likewise as a tonic, in combination with gentian, for intermittent fevers. Though very astringent and bitter to the taste, the root is farinaceous, and contains a large quantity of starch, which is edible and nutritious after being steeped in water. A considerable quantity of Bistort thus prepared is consumed in Russia and Siberia in times of scarcity instead of bread. In the northern counties of England the young shoots have long been known by the name of Easter-giant, and boiled for the table. Perhaps it was because of its being full-grown about Easter time that the plant had the old name of Passions. It was, too, called English Serpentry. The name Bistort is derived from its twisted roots, *bis*, twice, *torta*, twisted; and thence called by Turner *twice writthen*.

SPECIES XIV.—POLYGONUM VIVIPARUM. Linn.

PLATE MCCXLIV.

Billot, Fl. Gall. et Germ. Exsicc. No. 3463.

Rootstock rather slender, woody, shortly creeping, slightly branched; branches terminating in enlarged tubers. Stem erect, quite simple. Radical leaves on long stalks, elliptical-oblong or strapshaped-elliptical, attenuated nearly equally at both ends, but rather more so at the apex, very slightly decurrent on the petiole; stem leaves similar to the radical ones, but narrower and on shorter stalks. Ochreae tight, not fringed. Raceme spikelike, cylindrical, erect, solitary at the extremity of the stem, rather dense, continuous, or slightly interrupted but not leafy at the base, with sessile bulbilles instead of flowers on the lower part of the rachis. Peduncles not glandular: pedicels about as long as the nut, articulated immediately below the perianth, not glandular. Perianth coloured, without glands or prominent veins. Stamens 6 to 8. Styles 3, free to the base. Nut very rarely matured, shorter than the perianth, oval, triquetrous, acuminate at each end, smooth, shining. Leaves glaucous beneath.

On ledges of rocks and in damp places, principally by the sides of streams; frequent in mountainous districts. It occurs in Carnarvon, York, Durham, and Westmoreland, and is common in the Scotch Highlands, extending north to Shetland. Very rare in Ireland, where it is found only on Ben Bulbin, co. Sligo; and Glenarg, co. Leitrim.

England, Scotland, Ireland. Perennial. Summer.

Stems 6 to 18 inches high. Radical leaves on stalks 2 to 6 inches

long ; lamina 2 to 4 inches, variable in the proportions of the length to the breadth, the latter usually $\frac{1}{2}$ inch, whatever the former may be, margins narrowly revolute, even when full-grown ; stem leaves few. Ochreæ very long, continued far above the base of the leaf on the opposite side of the stem. Racemes 1 to 4 inches long, with scarious cuspidate bracts not surrounding the rachis, the lower part of which has minute ovoid acuminate purple bulbilles, the upper part cream-coloured or flesh-coloured flowers, with the perianth about $\frac{1}{6}$ inch long. Stamens and styles exserted. Nut about $\frac{1}{10}$ inch long, pale brown. Leaves subcoriaceous, deep green, and slightly shining above, dim and glaucous beneath.

Viviparous Bistort.

French, *Renouée vivipare*. German, *Spitzkeimender Knöterich*.

EXCLUDED SPECIES.

RUMEX RUPESTRIS. *Le Gall.*

Professor Babington says, "a plant found at St. Aubin's, Jersey, is probably" this. I am unacquainted with the supposed species, of which I have seen no specimens. I can see but little in the description to separate it from *R. conglomeratus*.

RUMEX MAXIMUS. *Scrib.*

A plant resembling *R. Hydrolapathum*, but with even the lower leaves subcordate, occurs near Lewes, Sussex. This may be *R. maximus*, and should be looked after.

RUMEX HISPANICUS. *Koch.*

This plant is described by Smith under the name of *R. Acetosa* in Eng. Fl., vol. ii. p. 196, no doubt from a cultivated example. The plate in Eng. Bot. seems to me the true *R. Acetosa*.

ORDER LXIII.—**ELÆAGNACEÆ.**

Shrubs or small trees with the branches sometimes spinous. Leaves alternate or opposite, shortly stalked, simple, entire, or dentate, commonly clothed beneath with peltate scarious entire or stellately-cleft scales. Flowers commonly unisexual and diœcious, rarely perfect or polygamous, regular, axillary or in lateral clusters or in catkins or panicles. Perianth single, more or less coloured on the inside ; 2- or 4-partite in the male flowers, tubular and 2- or 4-toothed in the

female—in the species with perfect flowers, bell-shaped, with the limb 4- or 6-cleft. Stamens 3 to 8, inserted on the edge of the glandular prolongation of the disk; anthers nearly sessile, 2-celled, opening longitudinally. Ovary solitary, free from the perianth, 1-celled and 1-ovuled; ovule 1, erect from the side of the ovary near the base, anatropous; style 1, elongated, stigmatiferous on one side. Fruit a nut, which becomes fleshy or bony at maturity, indehiscent, enclosed in the persistent perianth or its base. Seed with a membranous or cartilaginous testa; albumen fleshy; embryo straight; radicle inferior.

GENUS I.—**HIPPOPHAE**. *Lin.*

Flowers dioecious. Male flowers in the axil of ovate scales, 1 flower in each scale: perianth of 2 leaves, at first cohering at the apex, at length free: stamens 4, included within the perianth. Female flowers solitary, axillary: perianth tubular, with an erect bifid limb: disk none: style short; stigma elongate. Achene covered by the perianth, which in fruit becomes enlarged and juicy, so as to resemble a berry.

Prickly shrubs with narrow scattered leaves somewhat resembling those of an osier, but covered with silvery brownish scurfy scales beneath, at least when young.

The name of this genus of plants comes from the Greek words, *ἵππος* (*hippos*), a horse, and *φαῖω* (*phao*), I cause to shine or glisten. It is the ancient name of some unknown plant given to horses to make them sleek.

SPECIES I.—**HIPPOPHAE RHAMNOIDES**. *Lin.*

PLATE MCCXLV.

Reich. Fl. Germ. et Helv. Vol. XI. Tab. DXLIX. Fig. 1165.

Billot. Fl. Gall. et Germ. Exsicc. No. 2735.

Leaves strapshaped or oblong-strapshaped, attenuated at the base into a very short indistinct petiole. Perianth of the male flowers with roundish-oval leaves. Anthers short. Under surface of the leaves and young branches clothed with shining, more or less silvery brown scales; scales cleft only at the margins.

On sand-hills and waste places by the seashore. Very local. Abundant on the sand-hills at Deal, Kent, and in various places on the coast of Norfolk, between Great Yarmouth and Holkham; also about Alborough, Suffolk. It occurs on various other parts of the coast—Folkestone, Kent; near Canvey Island, and South Shoebury, Essex; near Whitby, Yorkshire; between Gosford and North Berwick,

ORDER LXIV.—**THYMELACEÆ.**

Shrubs or small trees, very rarely annual herbs, with the leaves alternate or opposite, simple and entire, not dotted. Stipules none. Flowers perfect or dioecious, usually regular, in terminal heads or spikes or in lateral clusters, rarely solitary, often enclosed by an involucre. Perianth single, usually coloured, rarely herbaceous, tubular or funnelshaped or salvershaped; tube free from the ovary; limb 4-, rarely 5-cleft; segments with imbricated æstivation. Petals absent or represented by scales inserted in the throat of the calyx. Stamens definite, usually 8 or 10, rarely 4 or 2, inserted on the tube or throat of the perianth; anthers 2-celled, opening longitudinally. Ovary solitary, free from the perianth, 1-celled; ovule 1, very rarely 2 or 3, and superimposed, pendulous, anatropous; style 1, sometimes very short; stigma undivided. Fruit a nut or drupe. Seed solitary, with a thin testa; albumen generally none, or, if present, in small quantity, and fleshy; embryo straight; cotyledons fleshy; radicle superior.

GENUS I.—DAPHNE. *Linn.*

Flowers perfect. Perianth withering and deciduous, coloured, salvershaped or salvershaped-funnelshaped; limb 4-cleft, spreading or ascending, without scales in the throat. Stamens 8, inserted in 2 rows in the upper part of the perianth-tube, included. Style sub-lateral, very short. Fruit drupaceous, containing a 1-seeded stone.

Small shrubs, rarely trees, with the leaves entire, alternate, very rarely opposite. Stipules none. Flowers lateral or terminal, often fragrant.

The derivation of the name of this genus of plants is asserted by Lindley, and some other botanists, to have been from the Greek name of the *Ruscus racemosus*, or Alexandrian laurel, into which it is fabled that Daphne was changed. It is stated in Rees' Cyclopædia that *Laurus nobilis* "is certainly the Daphne of Dioscorides, and consequently the classical laurel." It is still called by the same name among the modern Greeks; this is also the popular belief.

SPECIES I.—DAPHNE MEZEREUM. *Linn.*

PLATE MCCXLVI.

Reich. Fl. Germ. et Helv. Vol. XI. Tab. DLVI. Fig. 1181.

Billot. Fl. Gall. et Germ. Exsicc. No. 1546.

Stem erect, branched. Leaves oblanceolate, thin, deciduous. Flowers appearing before the leaves, in lateral clusters arranged in spikes below the apex of the branches, which afterwards produce terminal rosettes

of leaves. Tube of the perianth pubescent exteriorly; segments oval-oblong, acute, nearly as long as the tube. Drupe ovoid, red.

In woods. Rare and local, but widely distributed over England, though probably in many instances, possibly in all, introduced by the agency of birds. The counties where it is most probably native are Dorset, Sussex, Hants, Herts, Bucks, Berks, and Gloucester.

England [Scotland]. Shrub. Early Spring.

A small shrub 1 to 4 feet high, with spreading ascending branches clothed with brownish grey bark. Leaves 2 to 3 inches long, subpetiolate, subobtusate, entire. Flowers very fragrant, in clusters of 2 to 4 together, produced from buds formed in the axils of the leaves of the preceding year, opening at the same time as the leaf buds which terminate the branches, or often before them. Perianth about $\frac{3}{8}$ inch across, pale purplish pink within, darker on the outside of the segments and tube. Anthers yellow. Drupe berry-like, scarcely the size of a red currant, bright red, pointed, with a thin skin. Plant dull green; leaves paler and somewhat glaucous beneath, glabrous; the branches of the year pubescent; the flower-buds with purple scales.

Miconia.

French, *Daphné bois gentil*. German, *Gemeiner Kellerhals*.

The specific name of this shrub is said to be derived from *Madzaryon*, the Persian name by which it is known. It is a well known and favourite object in our gardens, valued on account of the beauty of its fruit and flowers. Its flowers appear before the leaves in February or March, when, as Cowper tells us, its branches are,

“Though leafless, well attired, and thick beset
With blushing wreaths, investing every spray.”

The whole plant is a powerful irritant, both bark, leaves, and fruit acting poisonously if taken in large quantities, and readily causing inflammation when applied to the skin or mucous membranes. A few of the berries have been known to cause death when swallowed, and the decoction of the bark, when administered medicinally, has produced unpleasant symptoms. Dr. Taylor, in his work on Poisons, details several cases of poisoning from swallowing the berries, which, however, were treated in time to prevent fatal results. The bark of the root is employed in this country, in the form of a decoction, as a sudorific, alterative, and deobstruent in rheumatism, scrofula, and some cutaneous diseases, being frequently given with sarsaparilla. We find it recognised in the British Pharmacopœia in a decoction. The bark and wood are similarly used on the Continent. An ointment prepared from the bark has been found beneficial to ulcers. The decoction with carbonate of ammonia is said to have revived patients from collapse resulting from typhus and scarlet fever. It has sometimes removed paralysis of the mouth and the throat. In France the bark is constantly used as an irritant application to the skin as a substitute for blistering. A piece of the fresh bark is dipped in vinegar, applied with the inner surface to the part, and covered over with an ivy or plantain leaf, and renewed twice a day. It soon produces a serous discharge, and, though it affects the skin, is seldom known to raise a blister,

and is very slightly painful, while producing most of the good effects that follow the application of the cantharides plaister. The berries are used in Germany and Siberia as a cathartic, but are unsafe and dangerous in unpractised hands. According to Linnaeus, they are used in Sweden to poison wolves and foxes. The Russian and Tartar women employ them as a cosmetic, to give their skin a rosy appearance—a dangerous practice if often repeated. When the berries have been accidentally eaten by children or others, the best remedies are oil, fresh butter, linseed tea, or milk, or some kind of emollient to allay the violence of the inflammation. The branches of the Mezereon afford a yellow die. It is of very easy culture. It is generally propagated by seeds, which, if suffered to dry before they are sown, will remain two years in the soil, but which, if sown in the autumn immediately after gathering them, generally come up the following spring. The best time for transplanting this shrub is in October, as it begins to vegetate soon after Christmas.

SPECIES II.—*DAPHNE LAUREOLA*. *Lin.*

PLATE MCCXLVII.

Reich. Fl. Germ. et Helv. Vol. XI. Tab. DLV. Fig. 1179.

Billot, Fl. Gall. et Germ. Exsicc. No. 448.

Stem erect, branched or nearly simple. Leaves oblanceolate, coriaceous, evergreen. Flowers in small shortly-stalked racemose clusters from the axils of the leaves of the rosette at the apex of the stem and branches. Tube of the perianth glabrous externally; segments oval-lanceolate, about half as long as the tube, which, however, is longer in proportion to the limb in the male than in the perfect flowers. Drupe ovoid, black.

In woods and thickets, in clay and chalky soils. Rather rare or local, but widely distributed in England. Very rare in Scotland, and having very slender claims to be considered native in that country, being only found in ornamental woods.

England [Scotland]. Shrub. Early Spring.

Stem 1 to 3 feet high, or rarely more, sparingly branched, with the branches ascending or erect, clothed with yellowish grey bark, bare of leaves except in the upper part. Leaves 2 to 5 inches long, very thick in texture, subpetiolate, acute. Clusters numerous, on short stalks, with 2 or 3 subherbaceous deciduous bracts. Flowers drooping, fragrant, 3 to 8 in each cyme, subracemose, some of the flowers male, others perfect. Rarely clusters are produced some distance down the stem, as well as at the apex. As the stem or branch elongates by the time the berries are ripe, they are left far below the apex of the branch. Perianth nearly $\frac{1}{2}$ inch long, $\frac{1}{4}$ inch across, pale yellowish green. Drupe $\frac{1}{2}$ inch long, pointed as in *D. Mezereum*, greenish black, very shortly stalked. Plant green, the leaves shining above, paler beneath, glabrous.

Spurge Laurel.

French, *Daphné lauréele*. German, *Wohlfriecheuder Kellerhals*.

The Spurge Laurel possesses similar properties to the Mezereon, and may in many cases be substituted for it. Though not showy in its flowers, it is a valuable plant for shrubberies, from its being evergreen, and from its thick glossy leaves being disposed in tufts at the end of its branches, so as to give it a full bushy appearance. It thrives best in the shade, and will grow under the drip of trees, where few other plants would thrive. The berries are black when ripe, and are a favourite food of singing-birds, though poisonous to all other creatures.

ORDER LXV.—SANTALACEÆ.

Annual or perennial herbs, or shrubs or trees, often subparasitical, with the leaves alternate (or sometimes the lower ones opposite), simple, entire, sometimes scalclike or absent. Stipules none. Flowers perfect or polygamo-dioecious, small, in terminal racemes, spikes, or panicles, or solitary and axillary. Perianth single, coloured within; tube adhering to the ovary; limb regular, 4- or 5-cleft, the segments with valvate æstivativa. Petals absent. Stamens definite, usually of the same number as the lobes of the perianth and inserted in their base; anthers 2-celled (very rarely 4-celled), opening longitudinally. Ovary solitary, adhering to the tube of the perianth, 1-celled; ovules commonly 3, but varying from 1 to 4, pendulous from the apex of the free central placenta, very rarely erect, anatropous; styles generally short; stigma 2- or 3-lobed. Fruit a nut, or drupe often crowned by the persistent perianth. Seed solitary, with a membranaceous testa; albumen dense, fleshy; embryo straight; cotyledons cylindrical; radicle superior.

GENUS I.—THESIUM. *Linn.*

Flowers perfect. Perianth persistent; tube herbaceous, adhering to the ovary; limb coloured within, funnelshaped, divided into 4 or 5 segments, which are connivent and more or less rolled inwards in fruit. Disk none. Stamens 5; anthers 2-celled. Style filiform; stigma capitate. Fruit dry, indehiscent, enclosed and adhering to the herbaceous calyx tube, and crowned by the segments of the perianth.

Subparasitical herbs or undershrubs with narrow alternate leaves, without stipules, and small flowers generally white on the inside of the limb.

It is said that this genus of plants was named in honour of *Thesens*, the mythic Grecian hero.

SPECIES I.—**THESIU** **HUMIFUSUM.** *D.C.*

PLATE MCCXLVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXLII. Fig. 1153.*Billot.* Fl. Gall. et Germ. Exsicc. No. 636.*T. linophyllum*, *Sm.* Engl. Bot. No. 247. *Hook. & Arn.* Brit. Fl. ed. viii. p. 379, non *Poll.* nec *D.C.**T. divaricatum*, var. *gallicum*, *gracile*, et *Anglicum.* *Alph. D.C.* in *D.C.* Prod. Vol. XIV. p. 643.

Stems very numerous, procumbent or ascending, diffuse, slender, wiry, often flexuous, simple or slightly branched. Leaves linear-strapshaped, 1-nerved, acute. Flowers in slender panicles, generally reduced nearly to racemes; branches of the panicle spreading in fruit, scabrous on the angle, the lower ones generally racemosely branched, the upper ones 1-flowered, and equalling or exceeding the flowers. Flowers each with 3 bracteoles at the base, the 2 shorter ones as long as the perianth or falling short of it. Perianth funnelshaped, the limb rolled inwards in fruit. Fruit sessile, attenuated at the base into a neck much shorter than the body of the nut, which is roundish-ovoid, with longitudinal ribs, crowned by the involute perianth segments, which are much shorter than the nut.

On grassy banks, chiefly on chalky and limestone soils. Rather local. Confined to the south of England, extending north to Gloucester, Oxford, Cambridge, and Norfolk.

England. Perennial. Summer, Autumn.

Root parasitic on various plants, yellowish, woody, passing insensibly upwards into the rhizome, which is many-headed. Stems very numerous, 3 to 18 inches long, slender, furrowed, spreading all round or to one side, frequently ascending at the apex. Leaves $\frac{1}{2}$ to 1 inch long, somewhat fleshy, with the midrib scarcely apparent. Panicle branched only at the base, or in weak specimens reduced to merely a raceme; when the branches are 1-flowered there is commonly no leaf at their base, but when there is more than one flower on the peduncle, each of these generally springs from the axil of a leaf or bract; stalk of the single flowers equalling the perianth, with 3 bracteoles at the apex, of which the lower one is considerably longer than the 2 others. Flowers about $\frac{1}{8}$ inch across, the segments fleshy, triangular, white inside, green on the back, spreading in flower, incurved in fruit. Style short, thick, with a capitate entire or slightly lobed stigma. Nut about the size of a mustard seed, olive. Plant glabrous, dull green, turning to yellowish green, the upper leaves and bracts with small cartilaginous teeth on the margins.

Bastard Toudflax.

French, *Thésion.* German, *Verneinkraut.*

*EXCLUDED SPECIES.***THESIU** **INTERMEDIUM.** *Schrad.*

"May be a native of Britain." (*Bab. Man. Brit. Bot. ed. vi. p. 298*). I have seen no specimens, nor can I hear of anyone who has.

THESIU **HUMILE.** *Vahl.*

Professor Babington gathered two specimens of this plant somewhere near Dawlish in Devonshire, in 1829, but it was probably not indigenous.

ORDER LXVI.—**ARISTOLOCHIACEÆ.**

Herbs or shrubs, in the latter case generally twining, and with the wood not in evident rings. Leaves alternate, sometimes 2 and sub-opposite, stalked, generally cordate, entire, rarely pedatifid. Stipules opposite the leaves, or leafy or absent. Flowers perfect, rarely unisexual, solitary or in fascicles in the axils of the leaves, rarely in racemes. Perianth single, usually coloured, with the base of the tube adhering to the ovary, tubular, with the limb very irregular and oblique, entire or 2- or 3-cleft, or regular and 3-toothed; segments with valvate æstivation. Petals absent. Stamens definite, usually 6 or 12, rarely 9; filaments very short and often adhering to the style; anthers 2-celled, longitudinally dehiscent. Ovary syncarpous, adhering to the bottom of the tube of the perianth, generally 6-celled, more rarely 3-celled, and very rarely 4-celled; ovules numerous, ascending or horizontal from the axis of the ovary, anatropous; style very short and thick; stigmas 6, radiating above the stamens. Fruit a capsule or berry loculicidally dehiscent, rarely indehiscent. Seeds numerous, with a membranaceous testa; albumen dense, fleshy or somewhat horny; embryo minute; cotyledons scarcely apparent until germination; radicle inferior.

GENUS I.—ASARUM. *Linn.*

Perianth bellshaped, with the tube wholly adherent to the ovary, or suburceolate and adhering to the ovary only by its base; limb regular, 3-cleft or 3-partite. Stamens 12, the filaments more or less distinct

from the style; anthers free from the style. Styles 6, free or united into one, in the latter case with 6 radiating stigmas. Fruit subcoriaceous or somewhat fleshy, bursting irregularly, crowned by the persistent perianth.

Stemless herbs with creeping rootstocks bearing a few reniform deltoid and cordate leaves on rather long stalks and a rather large solitary flower on a short scape.

Dr. Mayne gives the following derivation for the name of this genus of plant—“ἀ (a), negative, σαίρω (*sairo*), I adorn, because it was not introduced into the ancient chaplets or wreaths for the head.”

SPECIES I.—**ASARUM EUROPÆUM.** *Idem.*

PLATE MCCXLIX.

Reich Ic. Fl. Germ. et Helv. Vol. XII Tab. DCLXVIII. Fig. 1339.

Billot, Fl. Gall. et Germ. Exsicc. No. 450.

Rootstock creeping; stems very short, each producing 2 subopposite leaves. Leaves on long petioles, transverse or roundish reniform, deeply cordate, obtuse or subobtuse, subcoriaceous, subglabrous on the veins and petiole. Flowers terminal between the 2 leaves. Peduncle much shorter than the petioles, recurved. Perianth campanulate, with 3 thick ovate segments with reflexed points. Filaments free from the style. Style single, with a 6-lobed stigma.

In woods and among brushwood. Very rare. Perhaps not truly native, at least in many of its stations, though it is probably so near Salisbury, Wilts; Halifax, and near Settle, Yorkshire; Burnley, Lancashire; and in Westmoreland.

England, [Scotland.] Perennial. Spring, early Summer.

Rootstock extensively creeping, fleshy, producing numerous stems rarely above 1 or 2 inches high, which at the apex produce a pair of leaves with petioles 2 to 5 inches long, laminæ 2 to 3½ inches across. Peduncle $\frac{3}{4}$ to 1 inch long, and, as well as the perianth, woolly. Perianth about $\frac{1}{2}$ to $\frac{5}{8}$ inch long, lurid purple, tinged with green on the outside, brighter purple inside the segments. Filaments produced into a point beyond the anthers. Fruit subglobular-ovoid, crowned by the perianth segments, indehiscent. Leaves dark shining green, paler beneath, reclinate in veneration.

Asarabacca.

French, *Asaret d'Europe*. German, *Europäische Haselwurz*.

This plant has had a reputation from time immemorial as a cathartic, emetic, and irritant. It was in use among the Greeks, by whom it was called “*Ἀσάρον*.” Under the name of *Asarabacca* it was largely employed by the older physicians, but is now

expunged from the Pharmacopœia. The root contains a camphor-like principle and a bitter product called Asarin, which is combined with gallic acid. To these it is indebted for its action on the human system. Taken into the stomach in a state of very fine powder, it causes vomiting; in coarse powder it generally purges. It was formerly employed as an emetic instead of ipecacuanha, but, from the violence of its effects, it is now laid aside in medical practice; it is, however, used in veterinary medicine to vomit and purge. The fine powder applied to the nostrils causes sneezing, and a flow of mucus from the membrane which lines those parts. It is, therefore, extensively employed as an errhine, and is the basis or chief ingredient of many cephalic snuffs. It is used in chronic inflammations and some other diseases of the eye, and in headaches. When these last arise from disorders of the digestive functions, such means can be of no avail; when they are connected with congestion or fulness of the vessels of the head, the increased discharge from the Schneiderian membrane may give temporary relief, in the same way as a few drops of blood flowing spontaneously from the nose, or obtained by puncturing the membrane.

GENUS II.—ARISTOLOCHIA. *Linn.*

Perianth tubular, the tube extended and inflated beyond the ovary and generally contracted at the throat; limb irregular, oblique, simple or divided, the upper part of the tube and limb separating circumscissilely immediately above the ovary. Stamens 6, the filaments entirely adnate to the short thick style, so that the anthers appear sessile and situated on the style. Stigma of 6 spreading lobes. Capsule coriaceous, opening by six valves.

Climbing or erect herbs or shrubs, with alternate leaves, often ovate or roundish or reniform, cordate or hastate. Flowers lateral or axillary. Perianth tube often remarkably curved above the ovary.

The name of this genus of plants has reference to its supposed efficacy in childbirth, and is derived from the Greek words, *ἄριστος* (*aristos*), best, and *λοχία* (*locheia*), parturition.

SPECIES I.—ARISTOLOCHIA CLEMATITIS. *Linn.*

PLATE MCCL.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLXIX. Fig. 1340.

Billot. Fl. Gall. et Germ. Exsicc. No. 449.

Rootstock extensively creeping, cylindrical. Stem erect, not climbing, flexuous, simple. Leaves ovate deltoid, deeply cordate, subobtus. Flowers in umbellate fascicles in the axils of the leaves, erect. Peduncles shorter than the perianth and much shorter than the leaves. Lip of the perianth ovate-triangular, acuminate.

Among old ruins. Rare, and not indigenous, confined to the south and east of England. I have seen specimens only from Lakenham,

Suffolk; Carrow, Norfolk; and Godstowe Nunnery, Oxford. Yorkshire seems to be the most northern locality where it has been noticed.

[England.] Perennial. Summer.

Rootstock woody, scarcely as thick as the little finger. Stems stout, 18 inches to 2 feet high. Leaves 3 to 6 inches broad, and about the same length, very deeply cordate, the basal lobes projecting laterally inwards till they nearly touch each other. Flowers in fascicles of 4 to 8. Perianth about one inch long or a little more, pale greenish yellow. Fruit ovoid. Fruit pedicel recurved. Leaves pale green, somewhat glaucous beneath; plant glabrous.

Common Birthwort.

French, *Aristoloché clématite*. German, *Gemeine Osterluzei*.

The name of this plant and its supposed remedial powers are the suggestions of the doctrine of signatures, by the shape of the corolla. The root is aromatic and bitter, but not ungrateful to the palate. It has been used in the Portland powder for the cure of gout, but not without producing effects more formidable than the original disease. The ancients attributed great virtues to it. Gerard tells us that it is a singular and much-used antidote against the bite of the Rattlesnake, or rather Adder or Viper, whose bite is very deadly, and therefore, by the providence of the Creator, "hee hath upon his taile a skinny dry substance, parted into eels, which contain some loose, hard, dry bodies that rattle in them (as if one should put little stones or pease into a stiffe and very dry bladder), that so he may by this noise give warning of his approach, the better to be avoided; but if any be bitten, they know not stand in need of no better antidote than this root, which they chew and apply to the wound, and also swallow some of it downe, by which means they quickly overcome the malignitie of this poisonous bite, which otherwise would in a very short time prove deadly. Many also commend the use of this against the plague, smallpox, measles, and such like malignant and contagious disease." An opinion is said to prevail in France that the produce of vineyards in which this plant abounds becomes deteriorated in quality.

ORDER LXVII.—**EMPETRACEÆ.**

Small evergreen heathlike diffusely branched shrubs. Leaves crowded, alternate or subverticillate, linear-acerose, entire. Stipules none. Flowers diœcious, rarely perfect or polygamous, small, solitary or in small clusters in the axils of the leaves, very rarely in terminal clusters. Perianth double, subscarious, in 2 rows with 3 segments in each row, rarely with only 2. Stamens 3 in the male flowers, rarely 2; in the female absent or merely rudimentary, hypogynous; anthers 2-celled, opening longitudinally. Ovary rudimentary in the male flowers, in the female solitary, free from the perianth, seated on a disk, 3-, 6-, or 9-celled, rarely 2-celled; ovules solitary in each cell,

ascending from the central basal angle of the cell, anatropous; style short or absent. Stigma radiant, with as many segments as there are cells in the ovary. Fruit a berrylike, subglobose, depressed and umbilicate drupe, containing 2 to 9 pyrenes or minute stones. Seeds solitary in each pyrene; testa membranaceous; albumen abundant, fleshy; embryo straight; cotyledons short; radicle superior.

GENUS I.—EMPETRUM. *Linn.*

Flowers polygamous or diœcious, with 6 imbricated scales at the base. Perianth in 2 rows, the 3 outer leaves coriaceous, the 3 inner petaloid. Male flowers with 3 exerted stamens. Female flowers with a short style, with 6 to 9 radiating stigmas. Drupe subglobose, depressed, with 6 to 9 stones.

Small heathlike plants with the flowers minute, axillary, generally diœcious. Berries black.

The name of this genus of plants is derived from two Greek words, ἐν (*en*), in, πέτρος (*petros*), stone, from the places where the plant grows.

SPECIES I.—EMPETRUM NIGRUM. *Linn.*

PLATE MCCLI.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CLVIII. Fig. 4810.

Billot, Fl. Gall. et Germ. Exsicc. No. 2906.

Stem procumbent, much branched. Leaves oblong-strapshaped, with the margins folded back and meeting in a white line. Stigma with 9 rays. Plant glabrous.

On heaths. Generally distributed, especially in mountainous districts, except in the south of England, from which it now appears to be absent, although it formerly occurred in Sussex. Very abundant in the Scotch Highlands, descending nearly to the level of the sea. Local in Ireland, and rare in the south, though abundant on the mountains near Dublin and Wicklow, and in the west and north of that island.

England, Scotland, Ireland. Shrub. Spring, early Summer.

A small much branched procumbent or decumbent shrub, with the stems 3 to 18 inches long, wiry, and bare of leaves at the base; branches usually somewhat tufted and ascending. Leaves crowded, $\frac{1}{4}$ to $\frac{3}{8}$ inch long, much resembling those of a heath, coriaceous, evergreen, slightly rough on the borders, blunt, the lower ones reddish, the upper bright dark green. Flowers sessile, very minute, axillary.

Petals pale pink. Filaments very long. Drupe berrylike, about the size of a pea, jet black when ripe; pyrenes commonly 9, shaped like one of the segments of an orange, pale, opaque, roughened.

Crowberry.

German, *Schwarze Krähenbeere.*

This plant is known by the names of Black-berried Heath, Crakeberry, or Black Crowberry. The Highlanders frequently eat the berries, as sometimes do children, but they are not a desirable fruit, and, if taken in large quantities, occasion headache. Grouse feed upon them. Boiled with alum, they afford a purple dye.

ORDER LXVIII.—EUPHORBIAEÆ.

Herbs, shrubs, or trees with the juice often milky, the habit very various, sometimes (in exotic species) leafless and cactuslike, more commonly leafy with alternate or rarely with opposite leaves. Stipules present and then generally deciduous or more often absent. Flowers always unisexual, diœcious or monœcious, very variously disposed. Perianth single, double or absent. Stamens 1 to indefinite in the male flowers. Female flowers with the ovary free from the perianth, 3- more rarely 2- or many-celled; ovules 1 or 2 in each cell, anatropous, pendulous from the internal apical angle of the cells; styles as many as the carpels, distinct, united; stigmas distinct or united. Fruit commonly consisting of 3 (more rarely 2 or many) cocci, which usually break away from the columnella and split into 2 valves, or very rarely the capsule is loculicidally dehiscent into 3 valves. Seeds 1 or more rarely 2 in each coccum or cell of the fruit, with a crustaceous testa, generally carunculate or arillate; albumen fleshy; embryo large, with the cotyledons sometimes foliaceous; radicle superior.

GENUS I.—BUXUS. *Tournef.*

Flowers monœcious, distinct, not combined into a compound flower. Perianth with bracteoles at the base, of 4 unequal sepals arranged in the form of a cross. Male flowers with 4 free stamens. Female flowers with 3 separate styles. Capsule 3 pointed, separating above into 3 beaked valves, which are 2-horned at the apex from the splitting of the persistent styles; the 3 valves enclosing 3 cocci, each of which contains 2 seeds. Seeds smooth, shining.

Shrubs or small trees with opposite entire coriaceous leaves.

Flowers axillary, aggregated into fascicles, consisting of many male flowers and 1 female flower, or of male flowers only.

The derivation of the name of this genus of plants is from the word *πύλος* (*pulos*), from *πυκνάζω*, to grow thick or hard, in reference possibly to the hardness or closeness of the wood, or the density of the foliage. The Greeks called the boxes made of this wood, which were highly esteemed for their durability, *pyxides*; and hence probably arose the word *pyx*, which is used for the chest containing the Host in the Roman Catholic Church.

SPECIES I.—**BUXUS SEMPERVIRENS.** *Linn.*

PLATE MCCLII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CLIII. Fig. 4808.

Willd. Fl. Gall. et Germ. Exsicc. No. 639.

Leaves coriaceous, oblong-oval, obtuse or retuse at the apex, with thickened margins. Flowers in fascicles in the axils of the leaves of the upper branches. Anthers oval-oblong, sagittate-cordate. Branches of the year downy.

On dry chalky hills. Very rare, and probably not indigenous in most of its localities, though there appears to be some likelihood of its being truly native on Boxhill, Surrey. Kent, Surrey, Bucks, and Gloucester are the only counties of which there is any possibility of its being a genuine native.

England. Shrub. Spring.

A small much-branched tree-like shrub, in its native state 4 to 10 feet high, with dark greenish grey striate rugose bark, the younger branches opposite greenish and 4-angular. Leaves opposite, evergreen, very shortly stalked, $\frac{1}{2}$ to $1\frac{1}{2}$ inch long, crowded, subdistichous, glossy dark green above, paler and yellower beneath, entire on the margins. Flowers yellowish white, minute. Filaments rather long; anthers yellow. Capsule ovoid, with 3 horns, reticulate, $\frac{1}{2}$ inch long. Seeds about $\frac{1}{4}$ inch long, black, shining, smooth, bluntly trigonous.

Common Box.

French, *Buis toujours vert.* German, *Immergrüner Buchsbaum.*

This hardy evergreen tree or shrub is well known in every garden and shrubbery. It bears clipping and cutting better than almost any other tree of its size, and is well adapted for hedges, or for verdant architecture and decoration. It has long been a favourite in gardens, and, according to a French writer, "has the advantage of taking any form that may be wished under the hands of the gardener." Here it displays a niche cut in an apparently solid green bank; there, an arbour impenetrable to the rays of the sun. On one side it covers a wall with tapestry of continual verdure, and on the other it clothes a palisade; now it divides the walks of a garden, and now it marks

out the figure of a parterre. In all cases it presents a most agreeable verdure to the eye, and preserves the idea of cheerfulness even in winter, when almost every other tree appears "mourning for the absence of the sun." It grows slowly, rarely making shoots of more than 6 or 8 inches annually. In old gardens we frequently see box-trees cut into all sorts of fantastic shapes—to our modern taste disfiguring the natural growth of the tree, but greatly admired in ancient times. Pliny, in his garden at Tusculum, had hedges and bushes of box cut into figures of birds and animals, and he mentions a lawn as being adorned with similar decorations, and enclosed with verdant statuary. This practice was very common in all Roman gardens, and even in modern Rome at the present day we hear of it existing. Mr. Loudon says, in 1844: "In the garden of the Vatican, the name of the Pope, the date of his election, &c., may be read from the windows of the Palace in letters of box." Virgil calls it—

"Smooth-grained, and proper for the turner's trade,
Which curious hands may carve, and steel with ease invade."

The box-tree appears first to have been mentioned by Theophrastus, who ranks the wood with ebony, on account of the closeness of its grain. It takes a fine polish; is generally of an even yellow tint all through. For wood-engraving it is not only the best material yet discovered, but the only one that admits of the finely-cut lines that are necessary to produce the beautiful effects aimed at by the modern artist. English box-wood is, however, inferior to that obtained from Turkey, Spain, and other southern countries, though it fetches a very high price when of any useful size. For turnery the root is chiefly used in France. The town of St. Claude, which is near a large box-forest, is entirely inhabited by turners, who make snuff-boxes, rosaries, forks, spoons, buttons, &c., from box-wood. The wood of some roots is most beautifully marked, and the price of the articles manufactured varies accordingly. Box-wood is very apt to split when drying, but, to prevent this, the French turners put the wood designed for their finest works into a dark cellar as soon as it is cut, where they keep it from three to five years, according to circumstances. At the end of the given time they strike off the sap-wood with a hatchet, and place the heart-wood again in the cellar till it is wanted for the lathe. For the most delicate articles, the wood is soaked for twenty-four hours in fresh, very clear water, and then boiled for some time. When taken out of the water it is wiped perfectly dry, and buried till wanted for use in sand or bran, so as to be completely excluded from light and air. Articles made from wood thus prepared resemble Tunbridge ware in appearance, and are highly valued. The box-wood that is used by wood-engravers is chiefly imported from Turkey or Odessa, and sells in London for from 7*l.* to 14*l.* a ton, the average consumption in Britain being about 600 tons. In France the native trees are seldom of sufficient size for wood-engraving, and wood to the amount of 10,000 francs is annually imported from Spain. The box-trees that were cut down on Boxhill in 1815 sold for upwards of 10,000*l.*, and were chiefly used for turning. The art of cutting on wood was invented before that of printing, and it is supposed to have been practised between the years 1400 and 1430. It was first used for books of devotion and playing-cards. The earliest specimen extant is now in the possession of Earl Spenser, and represents St. Christopher carrying the infant Saviour; the date is 1423. In the gardens at Leven's Grove, in Westmoreland, there are some fine specimens of topiary work done in the time of James II. Wood-engraving is now carried to great perfection, and it is interesting to trace its development, from the early attempts at the mere rude outlines of figures on a block, to the finished and delicate designs of the present day, which bring the works of some of our best artists within the reach of the humblest lovers of art.

The geometrical style of gardening, in which the box-trees played so prominent a part, was brought to great perfection in the time of Louis XIV. The dwarf variety of box was used to trace out the pattern of a parterre, the space between the lines being filled in with different coloured sands, earths, shells, and other articles, so as to produce red, white, and black grounds, on which the green box appeared to advantage. Lord Bacon says: "As for making of knots and figures with divers coloured earths, they be but toys; you may see as good sights many times in tarts." We incline to think he would repeat his remark if he were introduced to a portion of the Horticultural Gardens at Kensington at the present day. The art of cutting the box and other trees into artificial forms was carried to such an extent among the Romans that both Pliny and Vitruvius use the word *topiarius* to express the art of the gardener—a proof that the art of clipping was considered the highest accomplishment for a Roman gardener. Topiary adornments, as they are called, were most highly prized in gardens about the middle of the seventeenth century, and began to go out of favour in the early part of the eighteenth, when they afforded subjects for raillery among the wits of the day:—

"There likewise mote be seen on every side
The shapely box of all its branching pride,
Ungently shorne, and with preposterous skill,
To various beasts, and birds of sundry quill
Transform'd, and human shapes of monstrous size."

In former times the uses of the box were various, but are now almost forgotten. The bark and leaves are purgative and sudorific. A tincture made from the leaves is used in Germany as a remedy in intermittent fever, having obtained its reputation from its employment by a quack, who sold the secret to Joseph I. The wood scraped to a powder has been used as a substitute for guaiacum, and an oil distilled from it is said to be good for toothache. According to Parkinson, a "decoction of the leaves and sawdust will change the hair to an auburn colour." We have not heard, however, of its use during the fashionable rage for auburn hair, although, we fear, far more objectionable applications are frequently employed to obtain the correct shade of auburn tresses by those who sacrifice nature to fashion. Box is sometimes substituted for holly in the churches at Christmas, and in a note to Wordsworth's poems we are informed that "in several parts of the north of England, when a funeral takes place, a basinful of sprigs of box is placed at the door of the house from which the coffin is taken up, and each person who attends the funeral takes one of these sprigs, and throws it into the grave of the deceased person."

The box is the badge of the Highland clan M'Intosh, and the variegated kind of the clan M'Pherson. It is asserted by many authors that box-trees are never cropped by cattle, and that the Corsican honey was rendered poisonous from the bees feeding on the flowers of the box. In our own experience we can testify to the death of several fowls, only to be explained by the fact of their having eaten largely of box-leaves. The largest box-trees in the neighbourhood of London are at Syon and Kew, each nearly 15 feet in height. In the Botanic Garden at Oxford there are two old trees, one of which, in 1835, was 21 feet high. The largest box-hedge is at R. tworth. It is supposed to be more than two centuries old, and is more than 12 feet broad at the bottom, 15 feet high, and 40 yards long. The only county in England in which the box appears to be naturalised is Surrey. It is so abundant in the neighbourhood of Dorking, as to have given the name Boxhill to a well-known pleasant locality about twenty miles from London.

The lines of Herrick, which refer to the custom of substituting box for holly at Candlemas in decorations, are worth quoting :—

“ Down with the rosemary and bays,
Down with the misseltoe ;
Instead of holly now upraise
The greener box for show.

“ The holly hitherto did sway :
Let box now domineer,
Until the dawning Easter day
Or Easter eve appear.”

GENUS II.—**EUPHORBIA.** *Linn.*

Flowers monœcious, combined into flower-like groups surrounded by a calyx-like involucre containing numerous male flowers and a single central stalked female flower. Common involucre bellshaped, with 4 or 5 segments, alternating with as many large thick glandular lobes, which are entire or notched and spreading, sometimes petaloid. Perianth absent. Male flowers reduced to a single stamen, with a joint showing its junction with the pedicel, which springs from a small bract at the base of the involucre. Female flower soon elevated on a stalk in the centre of the involucre, reduced to a 3-lobed and 3-celled ovary with 3 styles, sometimes with a very indistinct calyx at the base of the ovary. Capsule 3-lobed, splitting into 3 cocci; each coccum 1-seeded, bursting down the back, so as to form 2 valves.

Herbs and shrubs of very various habit, with white milky acrid juice.

This genus of plants was named after Euphorbus, physician to Juba, King of Mauritania, who is said first to have used some of the plants of this genus in medicine.

SECTION I.—**ANISOPHYLLUM.** *Raep. ap. Duby, Bot. Gall.*

Leaves opposite, with stipules. Flowers solitary in the forks of the stem or axillary.

SPECIES I.—**EUPHORBIA PEPLIS.** *Linn.*

PLATE MCCLIII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXXI. Fig. 4753.

Billot, Fl. Gall. et Germ. Exsicc. No. 1761.

Tithymalus auriculatus, Lam. Fl. Fr. Vol. III. p. 102.

Annual. Stems several from the crown of the root, prostrate, dichotomously branched. Leaves opposite, shortly stalked, oblong, half-cordate, obtuse or emarginate, nearly entire. Stipules minute,

setaceous, bipartite. Flowers shortly stalked, solitary in the forks of the stem and axils of the upper leaves. Involucral glands rounded, nearly entire. Capsule trigonous, the cocca faintly keeled on the back, smooth, glabrous. Seeds ovoid, smooth, white, without a caruncle. Plant glabrous; leaves fleshy, and slightly glaucous.

On sandy seashores. Very rare. In England confined to the south and west, extending east as far as Sandown Bay, Isle of Wight, and north to Aberystwith, Cardiganshire. In Ireland only at Garraris Cove, near Tramore, co. Waterford. More plentiful in the Channel Islands, where it occurs in Jersey, Guernsey, Alderney, Sark, and Herm.

England, Ireland. Annual. Late Summer, Autumn.

Stems prostrate, spreading in a circle, 2 inches to 1 foot long. Leaves rather distant, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, very unequal at the base, being prolonged into a rounded lobe on one side, and cut off into a wedgeshaped form on the other. Capsules about $\frac{1}{4}$ inch long, dim, with a very indistinct network of transverse veins. Seeds, when dry and ripe, with a white covering to the testa. Plant glaucous, at length more or less stained with purplish red.

Purple Spurge.

French, *Euphorbe des sables*. German, *Garten Wolfsmilch*.

SECTION II.—HELIOSCOPIA. *Racp.* ap. *Duby*, Bot. Gall.

Leaves alternate, scattered, without stipules. Flowering stem umbellate at the apex. Glands of the involucre rounded, entire.

SPECIES II.—EUPHORBIA HELIOSCOPIA. *Linna*

PLATE MCCCLIV.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXVII. Fig. 4754.

Billot, Fl. Gall. et Germ. Exsicc. No. 1951.

Tithymalus helioscopius, *Latour.* Fl. Fr. Vol. III. p. 93.

Annual. Stem solitary or several from the crown of the root, erect, unbranched between the base and the umbel. Leaves alternate, indistinctly stalked, wedgeshaped-obovate, gradually attenuated into the petiole at the base, rounded and emarginate at the apex, finely dentate-serrate in the apical half. Umbel of 5 rays, the rays 3-furcate, with the branches 2-furcate. Bracts roundish-obovate, not connate. Involucral glands rounded, entire. Capsule subglobular, trigonous, the cocca rounded on the back, smooth, glabrous. Seeds roundish-ovoid, alveolate, brown, with a small transversely-oval caruncle. Plant

glabrous, with the stems and branches sometimes sparingly pilose; leaves thin, slightly glaucous.

A weed in cultivated ground and in waste places. Very common, and universally distributed.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 6 inches to 2 feet high or more, rather stout and succulent, often giving off a pair of opposite secondary stems (or sometimes more) close to the ground. Leaves few, distant, spreading, increasing in size the higher they are placed on the stem, the 5 at the base of the umbel-rays largest, and $\frac{3}{4}$ to 2 inches long. Umbel-rays usually not more than twice as long as the leaves at their base, but in large specimens 3 or 4 times as long. Capsule $\frac{1}{8}$ inch long. Seeds dull brown, honeycombed. Plant light green, slightly glaucous; the bracts on the umbel-rays more or less tinged with yellow. Involucral glands bright yellow.

Sun Spurge.

French, *Euphorbe réveille-matin*. German, *Sonnenwendige Wolfsmilch*.

SPECIES III.—**EUPHORBIA PLATYPHYLLA.*** *Lin.*

PLATE MCCLV.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXXIII. Fig. 4758.

Willd. Fl. Gall. et Germ. Exsicc. No. 3465.

E. stricta, *Sm.* Engl. Bot. No. 333 (non *Lin.*).

Annual. Stems solitary or rarely 3 from the crown of the root, simple or with a few short flowering branches below the umbel. Leaves scattered, the lowest ones abruptly narrowed immediately below the cordate base, but not distinctly stalked, obovate-oblong, obtuse; the upper ones sessile and semi-amplexicaul, oblong, acute; all finely serrulate in the apical half. Umbel-rays 5, or in starved specimens 3 or 4, 3-furcate or 2- or 4- or 5-furcate, with the branches once or twice 2-furcate. Bracts† roundish-deltoid, truncate at the base, apiculate, not connate. Involucral glands rounded, entire. Capsule subglobular, trigonous; the cocca rounded on the back, sparingly clothed with small hemispherical tubercles. Seeds ovate-subglobular, smooth, shining, olive-brown, with a small reniform caruncle. Plant glabrous or sparingly pilose; leaves thin, slightly glaucous.

A weed in cultivated ground and in waste places. Rather rare, and almost confined to the south of England, reaching north to Cambridge,

* Sometimes written *platyphyllos*.

† Unless otherwise specified, the shape of the uppermost bracts only is intended in the description.

Northampton, and Worcester, and appearing again as a corn-field weed in Yorkshire.

England. Annual. Summer, Autumn.

Stem 6 inches to 3 feet high, sometimes with a pair of opposite secondary stems close to the ground, and commonly with a few short branches from the axils of the upper leaves. Leaves spreading or reflexed, $\frac{3}{4}$ to $1\frac{1}{2}$ inch long; the upper ones larger and narrower than the others, and more or less cordate. Leaves at the base of the umbel $\frac{1}{2}$ to 1 inch long. Umbel-rays varying in number—in starved specimens such as are figured as *E. stricta*, in the first edition of "English Botany," with only 3 or 4 rays, but, when well developed, with 5; these rays are usually three or four times as long as the reflexed leaves at their base. Bracts at the base of the forks of the rays rhombic-ovate; those near the apex of the rays widest at the base, so as to be deltoid. Capsule $\frac{1}{8}$ inch long, dotted over with minute warts whose height is no greater than their breadth. Seeds broader and more shining than in *E. Helioscopia*, and not at all honeycombed. Plant pale green, slightly glaucous; the bracts more or less tinged with yellow, and in autumn the whole plant often stained with bright red.

Broad-leaved Warted Spurge.

French, *Euphorbe à larges feuilles*. German, *Breitblättrige Wolfsmilch*.

SPECIES IV.—EUPHORBIA STRICTA. Koch.

PLATE MCCLVI.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXXIII. Fig. 4757.

Willd. Fl. Gall. et Germ. Exsicc. No. 1322.

E. platyphylla, var. β , *Hook. & Arn.* Brit. Fl. ed. viii. p. 383. *Benth.* Handk. Brit. Fl. ed. ii. p. 406.

Annual or biennial. Stems solitary or more rarely 3 from the crown of the root, simple below, usually with numerous short flowering branches in the upper part beneath the umbel. Leaves scattered, the lowest ones abruptly narrowed immediately below the cordate base, but not distinctly stalked, oblanceolate, subobtusely; the upper ones sessile and semi-amplexicaul, oblong-acute; all finely serrulate in the apical half or two-thirds. Umbel-rays usually five, but varying from 3 to 7, 3-furcate, or 2- or 4- or 5-furcate, with the branches once or twice 2-furcate. Bracts roundish-deltoid, subcordate at the base, apiculate, not connate. Involucral glands rounded, entire. Capsule subglobose, 3-lobed, the cocci rounded on the back, thickly clothed with small cylindrical tubercles. Seeds oval-ovoid, smooth, shining reddish-brown, with a small reniform caruncle. Plant glabrous or

with the stem and midribs of the leaves and bracts with a few hairs; leaves thin, slightly glaucous.

In woods, on carboniferous limestone. Very local. About Wyndcliff, and at Tintern, in Monmouthshire, and at Bream Scowles, between Bream and Sidney, in Gloucestershire.

England. Biennial or Annual. Summer, Autumn.

Very similar to *E. platyphylla*, but usually more slender, though attaining a height of 1 to 3 feet, commonly with more numerous short flowering branches below the umbel. Leaves very similar to those of *E. platyphylla*; but the uppermost bracts are more cordate at the base; the involucre considerably smaller; the stamens fewer, commonly not more than 1 or 2 in each involucre. The capsules are only about $\frac{1}{16}$ inch long, with a deep furrow along the 3 lines of junction of the cocci (while in *E. platyphylla* there is only a shallow one), and the tubercles are much longer, their length exceeding their height. The seeds are about half the size of those of the preceding species, more regularly oval, and reddish-brown instead of olive.

The plant retains all its characters in cultivation.

Bushy Warty Spurge.

French, *Euphorbe à petites fleurs*. German, *Steife Wolfsmilch*.

SPECIES V.—**EUPHORBIA HIBERNA.** *Linn.*

PLATE MCCLVII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXXVII. Fig. 4767.

Billot, Fl. Gall. et Germ. Exsicc. No. 1323.

Perennial. Rootstock thickened. Stems several from the crown of the rootstock, simple, or rarely with a few short flowering branches below the umbel. Leaves scattered, sessile, elliptical or oblong-elliptical, obtuse, quite entire, the uppermost ones more or less cordate and semi-amplexicaul. Umbel-rays usually 5, once or twice 2-furcate. Bracts roundish-ovate or -oval, subacute, not connate. Involucral glands reniform, entire. Capsule subglobular, 3-lobed, the cocci rounded on the back, sparingly clothed with conspicuous cylindrical tubercles. Seeds ovate-globular, smooth, greyish-brown, with a rather small semicircular caruncle. Plant wholly sparingly pubescent or pilose or subglabrous; bracts subglabrous; leaves rather thin, green, paler beneath.

In woods and hedges. Very local. Near Linton, North Devon. In Ireland it is more abundant, especially in the south-west, where it is frequent in Kerry and Cork, also at Anakirk in the county of Limerick, perhaps also on Slieve Baun, Roscommon, and reported from Donegal

and the neighbourhood of Belfast, but it has not been lately found in the last three stations.

England, Ireland. Perennial. Early Summer.

Stems very stout, 1 to 2 feet high, with numerous scattered leaves, $1\frac{1}{2}$ to 4 inches long, the lower leaves smaller than the upper. Umbel-rays when in fruit often not much exceeding the leaves at their base, and rarely more than twice as long. Bracts at the base of the forks more or less cordate, but those towards the apex of the rays with an obtuse-angled base. Capsule nearly $\frac{1}{4}$ inch long, with very deep furrows. Plant light green, the upper part tinged with yellow. The specimen of *E. hiberna* figured in "English Botany" was said to be sent from the neighbourhood of Belfast by Mr. Templeton, but the example was probably derived from his garden. See "*Cybele Hibernica*," p. 259.

Irish Spurge.

SPECIES VI.—**EUPHORBIA PILOSA.** *Linn.*

PLATE MCCLVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXXVIII. Fig. 4770.

E. palustris, *Bab.* Man. Brit. Bot. ed. vi. p. 301. *Hook. & Arn.* Brit. Fl. ed. viii. p. 384 (non *Linn.*).

Perennial. Rootstock thickened. Stems several from the crown of the rootstock, simple below, or with a very few barren branches, but usually with numerous flowering branches in the upper part beneath the umbel. Leaves scattered, sessile, oblong-strapshaped or elliptical-oblong, obtuse or subobtuse, finely serrate or obscurely serrate, the uppermost ones rounded at the base, but scarcely semi-amplexicaul. Umbel-rays unequal, usually 5, 3-furcate, and then once or twice 2-furcate. Bracts roundish-oval or -ovate, subapiculate, not connate. Involucral glands transversely elliptical, entire. Capsule subglobular, the cocca rounded on the back, sparingly clothed with small glandlike purplish tubercles, generally emitting white silky hairs. Seeds oval-globular, smooth, shining, brown, with a small suborbicular caruncle. Plant more or less pubescent or pilose; bracts subglabrous; leaves rather thin, green, paler beneath.

In woods and hedgebanks. Very local near Prior Bank in the neighbourhood of Bath, and stated to be found by Mr. Hemsley near West Meston, in Sussex.

England. Perennial. Early Summer.

Stems 18 inches to 3 feet high, stout, branched above so that the

flowers form a panicle with an umbellate top. Leaves $1\frac{1}{4}$ to 4 inches long, resembling those of *E. hiberna*, but with the sides more parallel and very finely serrate, hairy on both sides when young, at length nearly glabrous above. Umbel-rays rather short. Capsule $\frac{1}{2}$ inch long, with 3 moderately deep furrows and numerous minute purple raised dots, which give off white hairs; but these are easily rubbed off, so that in the dried plant the capsule is often quite glabrous.

Professor Babington, following the late Mr. E. Forster, now refers *E. pilosa* to *E. palustris* of Linnæus. It may be merely a subspecies of the latter, but it is certainly not identical with it. *E. palustris*, besides being glabrous, has the leaves more elliptical, more entire, and a much greater number of them produce short sterile leafy branches; the capsule has deeper furrows, and more conspicuous tubercles, which are destitute of hairs; the seeds are rounder, and the plant of a brighter green, with the midribs of the leaves more conspicuously paler.

Downy Spurge.

French, *Euphorbe poilu*. German, *Hohe Wolfsmilch*.

SPECIES VII.—**EUPHORBIA CORALLOIDES.** *Linn.*

PLATE MCCLIX.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXXVII. Fig. 4768.

E. procera, β *tricarpa*, *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 726.

E. pilosa, var. α , *Hook*, Brit. Fl. ed. iv. p. 326 (non *Linn.*).

Perennial. Rootstock scarcely thickened. Stems solitary or several from the crown of the rootstock, simple below, with a few flowering branches in the upper part beneath the umbel. Leaves scattered, sessile, oblong-strapshaped or elliptical-oblong, obtuse, faintly serrate in the apical half, the upper ones rounded at the base, but scarcely semi-amplexicaul. Umbel-rays 5, 3-furcate, and again 1- or 2-furcate. Bracts oval or lanceolate-oval, apiculate, not connate. Involucral glands transversely oval, entire. Capsule globular, without distinct tubercles, pilose, with white silky hairs. "Seeds obovate, minutely punctate, with faint netted bands" (*Bab.*). Plant, including the bracts, pubescent.

Near Slinfold Parsonage, Sussex, but no doubt introduced by the Rev. Mr. Manningham, the friend of Dillenius, and formerly rector of the parish of Slinfold.

[England.] Perennial or Biennial (*Bab.*?). Early Summer.

Stem rather slender, 1 to 3 feet high. Leaves $1\frac{1}{2}$ to 3 inches long. Umbel-rays rather short. Capsule $\frac{1}{2}$ inch long. The ripe seeds I have not seen.

E. coralloides bears considerable resemblance to *E. pilosa*, but the

rootstock is smaller; the umbel is more regular, more expanded, and with far fewer branches below it, so that the inflorescence does not resemble a panicle; the leaves are more softly pubescent, and retain their pubescence longer, and the upper bracts (which in *E. pilosa* are nearly glabrous) are densely pilose-pubescent especially when young; the capsule is destitute of warts; the stem and leaves generally tinged with red.

Coral Spurge

French, *Euphorbe corail*.

SECTION III.—ESULA. *Raep. ap. Duby, Bot. Gall.*

Leaves scattered, without stipules. Flowering stem umbellate at the apex. Involucral glands lunate or sublunate, with projecting cusps or horns at the sides.

SPECIES VIII.—**EUPHORBIA AMYGDALOIDES.** *Lin.*

PLATE MCCLIX.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CL. Fig. 4799.

Willd., Fl. Gall. et Germ. Exsicc. No. 453.

E. sylvatica, Jacq. Fl. Austr. Vol. IV. p. 39.

Perennial. Rootstock woody. Stems rather stout, erect, somewhat shrubby at the base, nearly simple below, or with a few barren branches from the base, and with very numerous short flowering branches in the upper part below the umbel. Leaves on the barren shoots indistinctly stalked, oblanceolate, increasing in size towards the apex of the stem, where they are so crowded as to form an imperfect rosette at the end of the year's growth; leaves on the flowering stem above the rosette much smaller, lanceolate, and the upper ones oblong; all obtuse and apiculate, entire. Umbel-rays 5 to 10, equal, once or twice 2-furcate. Bracts semicircular, more or less completely connate. Involucral lobes lunate, with rather long acute slightly converging cusps. Capsule globular, 3-lobed; cocci rounded on the back, studded with minute white scalelike dots, glabrous. Seeds ovate-subglobular, abruptly acuminate, smooth, ashy-grey, with a minute suborbicular caruncle. Plant more or less pubescent; the leaves of the rosette rather thick and evergreen, the others thin and pale green.

In woods and on shady hedgebanks, more rarely on banks and amongst stones. Common, and generally distributed in the south of England, but becoming scarce in the midland counties, and very rare in the north, where it occurs between Bolton and Wickhill Park, in

the Ainsty of Yorkshire, and at Linden near Alnwick, in Northumberland. Very rare in Ireland, where it grows by the river in the park of Castle Bernard, near Bandon, co. Cork.

England, Ireland. Perennial. Spring and early Summer.

Stems of two kinds, barren and fertile; barren ones rarely above a foot high, with the leaves increasing in size nearly to the apex, the largest leaves 3 or 4 inches long. These upper leaves remain through the winter, while the lower ones drop off and leave scars. In the succeeding year these barren stems elongate at the apex, leaving the spreading rosette of the previous year's leaves at the base of the new shoot, which lengthens till the whole is 2 to 3 feet high: the leaves on the new portion are rarely above 1 or 1½ inch long. Leaves at the base of the umbel-rays oval. Flowers in a long narrow panicle formed by the numerous short axillary branches in the upper part of the stem. Each pair of bracts more or less completely united, the two usually about 1 inch across, and more or less tinged with bright yellow. Capsule ⅙ inch long, yellow. Plant pale green, except the leaves of the rosette, which are usually deep green, but in autumn the whole is sometimes tinged with red.

A form of this species grows on stony slopes in the Isle of Portland. The whole plant is not above 9 inches to 1 foot high; the barren shoots about 6 inches; the leaves of the rosettes densely pilose on the under sides and at the margins with white hairs. On the flowering stem the large leaves of the rosette soon decay, and the part above it is very densely clothed with fulvous hairs; the branches below the umbel are few in number or absent, so that the paniculate form of inflorescence is not developed.

Woody Spurge.

French, *Euphorbe des bois*. German, *Mandelblättrige Wolfsmilch*.

The milky juice of this and other species of spurge is very acrid, and though not highly poisonous, corrodes and ulcerates the flesh wherever it is applied. Warts and corns anointed with it are said soon to disappear, but great caution is needed in using it, or injury is likely to result to the surrounding skin. It is said to be a remedy for toothache, but it is of so very acrid a nature that we do not recommend it. We have several cases related in works on jurisprudence of poisoning with the juice of the different species of spurge. Dr. Christison and Dr. Taylor both relate instances of death following its administration in a very short time.

SPECIES IX.—*EUPHORBIA ESULA*. *Linm.*

PLATE MCCLXI.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXLVI. Fig. 4791.

Billot, Fl. Gall. et Germ. Exsicc. No. 1325.

Perennial. Rootstock creeping. Stems rather stout, erect, simple at the base, with numerous short barren leafy branches in the middle,

and with a few flowering branches below the umbel. Leaves scattered, sessile, oblong or oblong-strapshaped, slightly narrowed towards the base, obtuse, apiculate, entire or indistinctly denticulate; those in the lateral branches narrower. Umbel-rays 8 to 20, once or twice 2-furcate. Bracts reniform-deltoid, cordate, shortly cuspidate or mucronate, not connate. Involucral glands lunate, with short parallel cusps. Capsule globular, 3-lobed; cocci rounded and with minute scalelike tubercles on the back, where there is a very faint longitudinal furrow, smooth on the sides. Seeds rectangular-ovoid, smooth, brown, with a small suborbicular caruncle. Plant glabrous; leaves rather thick, slightly glaucous above, more so beneath.

Var. *α*, *genuina*.

E. Esula, *Bor. Fl. du Centr. de la Fr.* Vol. II. p. 570.

Leaves oblanceolate-strapshaped or oblong-strapshaped.

Var. *β*, *Pseudo-cyparissias*.

E. *Pseudo-cyparissias*, *Jord. in Billot*, annot. p. 28. *Bor. l. c.* Vol. II. p. 569.

Leaves strapshaped, those of the barren branches linear-strapshaped.

In woods and borders of fields. Rare, and perhaps not native. Var. *α* I have seen only from the neighbourhood of Edinburgh, where it is found in various places. Var. *β*, Bellingham, and Hulme Abbey, near Alnwick, Northumberland.

England, Scotland. Perennial. Summer.

Stem 1 to 2 feet high, with numerous spreading leaves, 1 to 2 inches long, which vary considerably in breadth. Flowers in an indistinct short panicle. Umbel-rays rather long, suberect, forked only at the apex. Bracts large, the pair at the base of the fork $\frac{1}{2}$ to $\frac{3}{4}$ inch across. Capsule $\frac{1}{8}$ inch long. Leaves slightly fleshy, spreading.

The var. *β* has frequently been mistaken for E. *Cyparissias*, of which it has somewhat the habit.

Leafy-branched Spurge.

French, *Euphorbe érule*. German, *Gemeine Wolfsmilch*.

SPECIES X.—EUPHORBIA CYPARISSIAS. *Linn.*

PLATE MCCLXII.

Reich. Ic. Fl. Germ et Helv. Vol. V. Tab. CXLVII. Fig. 4793.

Billot, Fl. Gall. et Germ. Exsicc. No. 74.

Perennial. Rootstock creeping, with subterranean stolons. Stems

erect, simple at the base, with several elongating barren leafy branches in the upper part, and with a few short flowering branches immediately below the umbel. Leaves scattered, crowded, sessile, strapshaped, obtuse, entire, those on the barren branches linear-strapshaped. Umbel-rays 12 to 20, once or twice 2-furcate. Bracts roundish-deltoid, subcordate, subobtuse, scarcely mucronate, not connate. Involucral glands lunate, with short incurved cusps. Capsules globular, 3-lobed; cocca rounded on the back, with 2 broad bands of minute scale-like points, one on each side of the faint dorsal furrow. Seeds quadrate-subglobular, smooth, dim, ashy-grey, with a rather large suborbicular caruncule. Plant glabrous; leaves rather thick, more or less glaucous.

In woods, but probably only where it has been planted. The only place where it may be wild is at Whitbarrow, in Westmoreland. Besides this it is reported from the counties of Hants, Bedford, Stafford, Salop, Glamorgan, York, Cumberland, Edinburgh; but probably in some of these stations *E. Esula* has been mistaken for it.

[England, Scotland.] Perennial. Spring, early Summer, and again in Autumn.

Stem 6 inches to 1 foot high. Leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, those on the barren branches crowded and extremely narrow. These barren branches, late in the year, elongate, so as to overtop the primary umbel, and often flower in autumn, but at first they are very short. Umbel-rays erect, rather short, forked only at the very apex. Bracts pale yellow, at length often tinged with red, the pair at the base of the fork $\frac{1}{3}$ to $\frac{1}{2}$ inch across. Capsule $\frac{1}{10}$ inch long. Leaves somewhat fleshy, at first imbricated, at length spreading.

The only species with which this can be confounded is the narrow-leaved variety of *E. Esula*: but *E. Cyparissias* has the rootstock with the stolons running underground for a greater length; the stems shorter, with the upper branches more upright and elongating to a greater extent; the leaves much more numerous, shorter, and much narrower; the umbel before flowering more hemispherical, and flowering while the rays are still so short that it resembles a head; the bracts are paler, considerably smaller, less cordate and less mucronate; the cusps of the glands shorter; the capsule smaller, about $\frac{1}{10}$ inch long, roughened over a greater part of the back; the seeds more globular and with an ashy covering.

Cyprus Spurge.

French, *Euphorbe petit cyprès*. German, *Cypressen Wolfsmilch*.

SPECIES XI.—**EUPHORBIA PARALIAS.** *Linn.*

PLATE MCCLXIII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXLV. Fig. 4789.*Billot*, Fl. Gall. et Germ. Exsicc. No. 845.*Tithymalus maritimus*, *Lam.* Fl. Fr. Vol. III. p. 90.

Rootstock woody, branched at the top, not creeping. Stems erect or ascending, some short and barren, others longer and flowering; the latter simple or with short barren branches below, and sometimes a few very short flowering ones below the umbel. Leaves scattered, crowded, imbricated at the base of the flowering stems, sessile, oblong or lanceolate-oblong, entire, subobtusate; the upper ones broader. Umbel-rays 5, rarely 3, 4, 6, or 7, once or twice 2-furcate. Bracts roundish-deltoid, subcordate, obtuse, apiculate, not connate. Involucral glands lunate, with short diverging cusps. Capsule globular, 3-lobed; cocci rounded on the back, with 2 broad bands of wrinkles, one of which is on each side of the faint dorsal furrow. Seeds broadly ovate-ovoid, slightly roughened with minute points, dim ashy-white, with a very minute roundish-reniform caruncule. Plant glabrous; leaves thick, leathery-fleshy, very glaucous.

On sands by the sea. Rather common in the south and west of England, extending from Hants to Cumberland and the Isle of Man. Rare on the east coast, where it does not occur north of Suffolk. Local in Ireland, but widely distributed round the coast of that island.

England, Ireland. Perennial. Summer, Autumn.

Rootstock woody, buried among the loose sand; in old plants producing a number of stems from the point where it emerges from the ground; many of these stems are barren, and do not flower until the succeeding season. Fertile stems 9 to 18 inches long, rather thick, very densely leafy. Leaves $\frac{1}{2}$ to 1 inch long, concave above, convex beneath, spreading on the barren branches and upper part of the fertile stems, but adpressed at the base of the latter, and on the whole plant when it has been gathered for a short time; upper leaves, especially those at the base of the umbel-rays, broader than the others. Umbel-rays short, thick, usually not above 1 or 2 inches long, but in very luxuriant plants sometimes as much as 4 inches. Bracts $\frac{1}{2}$ to $\frac{3}{4}$ inch across the pair. Involucral glands often denticulate between the cusps. Capsule $\frac{1}{5}$ inch long. Seeds very minutely dotted all over; caruncule small and very deciduous. Plant pale glaucous green, becoming whitish when dry; the lower part of the stem and leaves frequently tinged with red.

Sea Spurge.

French, *Euphorbe maritime*.

SPECIES XII.—**EUPHORBIA PORTLANDICA.** *Linn.*

PLATE MCCLXIV.

E. segetalis, *Benth.* Handbk. Brit. Bot. ed. ii. p. 408 (non *Linn.*).

Rootstock somewhat woody, branched only where it emerges from the ground, not creeping. Stems rather slender, erect or ascending, some of them short and barren, others longer and flowering; the latter simple or with a few flowering branches, or sometimes with numerous flowering branches beneath the umbel. Leaves scattered, crowded at the base of the flowering stems and on the barren shoots, but often distant in the upper part of the former, sessile, strapshaped-oblancoate, or in the upper part of the flowering stems obovate, entire, acute, or on the flowering stems obtuse and apiculate. Umbel-rays 5, more rarely 2, 3, or 4, three or four times 2-furcate. Bracts ovate-deltoid or rhombic-ovate, apiculate, not connate. Involucral glands lunate, with 2 long incurved slender cusps (rarely absent). Capsule globular, 3-lobed; cocca rounded on the back, with 2 narrow bands of raised points, one along each side of the very faint dorsal furrow. Seeds subquadrate-ovoid, with numerous elongate foveæ, ashy-white, with a large conical hoodshaped caruncule, which is notched on the inner side. Plant glabrous; leaves rather thick, glaucous.

On stony banks and cliffs by the sea, or on sandy and shingly seabeaches. Rather rare, and exclusively confined to the south-west and west coast, extending from the Isle of Wight and Stokes Bay to the Mull of Galloway. Local, but widely distributed in Ireland.

England, Scotland, Ireland. Perennial. Early Summer to Autumn.

Rootstock somewhat woody, slender. Stems usually numerous, so that the plant forms a small bush 6 to 18 inches high. Leaves, especially on the flowering stem, soon falling off and leaving it marked with scars; those on the barren shoots narrower, and more acute than the rest, the length varying from $\frac{1}{4}$ to 1 inch; when growing, the leaves are spreading, but as soon as the plant is pulled up and begins to wither, they become adpressed. Umbel-rays rather long, sometimes occupying nearly half the height of the plant. Bracts $\frac{1}{2}$ to $\frac{3}{4}$ inch across the pair. Capsule $\frac{1}{8}$ inch long. Seeds brown when moist, but, like many of the other species of this genus, the covering becomes ashy-white when dry. Stems, and sometimes the leaves and bracts, frequently tinged with bright red in autumn.

Mr. Bentham refers this plant to the south European *E. segetalis*, which is an annual plant with narrower leaves and cordate bracts,

and involucreal glands with longer cusps: it ought perhaps to be considered distinct from *E. Portlandica* only as a subspecies.

Portland Spurge.

French, *Euphorbe de Portland.*

SPECIES XIII.—EUPHORBIA PEPLUS. Linn.

PLATE MCCLXV.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXI. Fig. 4773.

Billot, Fl. Gall. et Germ. Exsicc. No. 1326.

Annual. Stems slender, solitary or dividing into 3 at its base, erect or ascending, usually branched in large plants, and with a few flowering branches below the umbel. Leaves alternate, shortly stalked, obovate or roundish-obovate, gradually attenuated into the short petiole, obtuse, apiculate. Umbel-rays 3, three to six times 2-furcate. Bracts sessile, ovate, unequally rounded at the base, entire, apiculate. Involucreal glands sublunate, with 2 long slender diverging cusps. Capsule trigonous; cocci with 2 raised waved keels on the back, leaving a deep central furrow between them. Seeds rectangular-ovoid, keeled on the back, and having on each side of the keel 3 or 4 large foveæ in a line, 3 foveæ in another line on each side, and a single large furrow-like fovea on each side of the raphe, ashy-white, with a rather large roundish caruncle, notched on the inner side. Plant glabrous; leaves thin, pale green, scarcely glaucous.

A weed in gardens, cultivated ground, and waste places. Very common, and generally distributed.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 6 inches to 1 foot high, the umbel at length occupying nearly half the height of the plant. Leaves, including the petiole, $\frac{1}{4}$ to 1 inch long, increasing in size upwards the higher they are placed on the stem. Capsule $\frac{1}{10}$ inch long. The glands of the involucre have very long cusps, and present a miniature resemblance to a skate's egg cut in half. Plant yellowish-green.

Petty Spurge.

French, *Euphorbe des vignes.* German, *Garten Wolfsmilch.*

SPECIES XIV.—EUPHORBIA EXIGUA. Linn.

PLATE MCCLXVI.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXLI. Fig. 4777.

Billot, Fl. Gall. et Germ. Exsicc. No. 455.

Annual. Stems slender, solitary or dividing into 3 or more at the

base, erect or ascending, usually branched in large plants, and sometimes with a few flowering branches below the umbel. Leaves alternate, strapshaped or linear-strapshaped, abruptly acute or truncate and apiculate, entire. Umbel-rays 3, rarely 4 or 5, two to six times 2-furcate. Bracts lanceolate or triangular-lanceolate, unequally rounded at the base, and sometimes subhastate, from the presence of a tooth a little above the base, otherwise entire, acute. Involucral glands sublunate, with long slender diverging cusps. Capsule globular, trigonous; cocci rounded on the back, and each with a narrow slightly raised band of elevated points on each side of the faint dorsal furrow. Seeds rectangular-ovoid, keeled on the back, rugose, with very numerous irregularly disposed transverse foveæ having irregular ridgelike tubercles between them, pitchy black, tinged with ashy-white, with a small conical hooded caruncle. Plant glabrous; leaves thin, pale green, scarcely glaucous.

A weed in cultivated fields, waste ground, and gardens, and generally distributed in England and the south of Scotland; rare north of the Tay, and absent from the northern counties. Rather local, but widely distributed in Ireland.

England, Scotland, Ireland. Annual. Summer, Autumn.

A slender plant, sometimes with the stems erect, sometimes spreading, especially when the stems are numerous from one root. The stems are 3 to 18 inches high. Leaves $\frac{1}{2}$ to 1 inch long. Umbel frequently occupying half the whole height of the stem, but sometimes not above a quarter of it. Capsule $\frac{1}{10}$ inch long.

In this plant the leaves are sometimes acute and sometimes truncate and mucronate, when it becomes *E. retusa*, *D.C.* (non *Forsk.* nec *Cav.*). This form occurs in Britain, as well as the type, but I have not seen the form described with leaves 3-lobed at the apex, which is *E. rubra*, *D.C.* (non *Cav.*).

Dwarf Spurge.

French, *Euphorbe fluet.* German, *Kleine Wolfsmilch.*

SECTION IV.—LATHYRIS. *Gren.* and *Godr.*

Leaves opposite, decussate, without stipules. Flowering stem umbellate at the apex. Involucral glands lunate, with blunt ascending cusps.

SPECIES XV.—**EUPHORBIA LATHYRIS.** *Linn.*

PLATE MCCLXVII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXLIII. Fig. 4783.

Biennial. Stem very stout, simple or with short branches or axillary tufts of leaves. Leaves opposite, decussate, sessile, strapshaped, acute, entire, the uppermost ones lanceolate-strapshaped. Umbel-rays 4, often unequal, somewhat irregularly three or four times 2-furcate. Bracts ovate or lanceolate, acuminate, subcordate, acute, mucronate. Involucral glands lunate, with the cusps very blunt, diverging and ascending. Capsule globular, trigonous; the cocca rounded on the back, smooth. Seeds subcylindrical-ovoid, laterally compressed, rugose with anastomosing longitudinal ridges, pitchy black, rounded and slightly furrowed on the back, with a large hemispherical caruncle notched on the inner side. Plant glabrous; stem very glaucous; leaves leathery-fleshy, dark green above with a white midrib, paler and somewhat glaucous beneath.

In copses, in rocky woods. Very rare. Probably native near Bath. It is found not unfrequently in cultivated ground and waste places in England and the south of Scotland, but cannot be regarded as indigenous in such localities.

England, [Scotland, Ireland.] Biennial. Summer.

E. Lathyris is very unlike all the other species of this genus. The first year of its growth a very stout stiff stem is sent up with very numerous narrow leaves 3 to 8 inches long; these leaves spread horizontally, and are perfectly decussate, so that, looking down the stem, they form a perfect cross. In the succeeding year an umbel is produced at the apex of the stem, when the whole attains a height of 18 inches to 4 feet. The involucre resembles a perianth with 2 rows of segments, the outer row being simulated by the glands, which have their cusps ascending instead of spreading horizontally. The capsule is about $\frac{1}{2}$ inch long, the seeds nearly $\frac{1}{4}$ inch.

Caper Spurge.

French, *Euphorbe épurge.* German, *Kreuzblättrige Wolfsmilch.*

The capsules of this species of spurge have been used as a substitute for capers, but are extremely acrid, and not fit to eat till they have long been macerated in salt and water, and afterwards in vinegar; indeed, it may be doubted whether they are even then wholesome as a condiment.

GENUS III.—**MERCURIALIS.** *Tournef.*

Flowers diœcious or monœcious, distinct, not united into a com-

pound flower. Perianth 3- or 4-partite, with the segments valvate in æstivation. Male flowers with 8 to 16 stamens. Female flowers with 2 or 3 abortive stamens reduced to filaments, and a 2- rarely 3-lobed ovary, with as many styles as there are lobes. Capsule 2-lobed, splitting into 2 cocci, each coccum 1-seeded, bursting down the back so as to form 2 valves; rarely there is the addition of a third coccum.

Herbs or more rarely undershrubs, with the leaves generally opposite, stipulate. Flowers axillary and terminal; the male flowers in glomerules, arranged in interrupted spikes or spikelike racemes; the female flowers fascicled or solitary, more rarely in spikes or racemes.

This genus of plants is said to be named after Mercury, who discovered the virtues of the species.

SPECIES I.—**MERCURIALIS PERENNIS.** *Linn.*

PLATE MCCLXVIII.

Perennial. Rootstock creeping. Stems simple, herbaceous. Leaves shortly stalked or subsessile, ovate or ovate-lanceolate or elliptical or oval, the lowest ones minute or rudimentary and distant. Male flowers in small glomerules, arranged in interrupted stalked axillary spikes. Female flowers in few-flowered axillary stalked racemes, which are often reduced to a single flower. Capsule rather large, didymous, slightly roughened, thickly clothed with bristly hairs. Seeds subglobular, slightly shining, reticulated. Leaves green, thinly pubescent.

Var. α , *genuina*.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CLII. Fig. 4804.

Billot. Fl. Gall. et Germ. Exsicc. No. 641.

M. perennis, *Reich.* Fl. Germ. Excurs. p. 764, and Ic. l. c. p. 10. *Koch.* Syn. Fl. Germ. et Helv. ed. ii. p. 731.

Leaves shortly stalked, ovate or ovate-lanceolate or elliptical.

Var. β , *ovata*

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CLI. Fig. 4803.

M. ovata, "*Hope and Sternb.*" *Reich.* Fl. Germ. Excurs. p. 764, and Ic. l. c. p. 9.

Leaves subsessile or sessile, broadly-oval or ovate-oval.

In woods, thickets, and on shady hedgebanks. Common, and generally distributed, except in Ireland, where it is rare. Var. β , "Hurst Pierpoint, Sussex" (Mr. W. Mitten).

England, Scotland, Ireland. Perennial. Spring.

Rhizome slender, white, creeping horizontally. Stems usually solitary from the apex of the rhizome, appearing above ground in early spring, erect, 9 inches to 2 feet high; the lower internodes distant and with very minute leaves, the upper internodes short; all with a raised line on each side running from between the stipules to the leaf below. Leaves largest above the middle of the stem, when full-grown $2\frac{1}{2}$ to 4 inches long, including the petiole, which is less than the width of the lamina; this is rather thin, varying from ovate to lanceolate or elliptical; uppermost leaves narrower than the lower ones; all of them rounded at the base, acuminate or acute, crenate-serrate. Stipules very minute, lanceolate or subulate. Flowers diœcious, produced before the leaves are full-grown. Male plant with leafless axillary peduncles from the axils of the middle and upper leaves; glomerules occupying the upper half of the peduncle; flowers shortly stalked: perianth of 3 ovate-acuminate concave segments; stamens 9 to 12. Peduncles of the racemes of the female plant shorter than in the male, often with only a single terminal flower, but sometimes with 2 or 3 rather remote ones: each flower distinctly stalked; perianth similar to that of the male flowers, with 2 subulate abortive stamens, and a 2-lobed bristly ovary, terminated by 2 large recurved styles, stigmatiferous on the upper side. Capsule nearly $\frac{1}{4}$ inch long by $\frac{3}{8}$ broad, of 2 cocci, which split with elasticity. Seeds greyish, pointed or crested at the apex, slightly shining, with blunt elevated ridges when young, invested by a very thin membrane, which adheres closely to the ripe seed. Stem often purplish at the base, thinly hispid; leaves deep green, darker coloured and usually narrower in the female plant than in the male, turning blue when carelessly dried.

Perennial Dog's Mercury.

French, *Mercuriale vivace*. German, *Ausdauerndes Bingelkraut*.

This plant was formerly used in medicine, but has long been abandoned as a remedy. We find it spoken of in the old herbals as possessing wonderful powers. Culpepper writes: "Mercury, they say, owns this herb, but I rather think 'tis Venus, and am pretty confident of it too; for I never read that Mercury ever minded women's business so much. I believe he minds his study more." Gerard tells us that "Costacus, in his booke of the 'Nature of Plants,' saith that the juice of mercury, hollyhock, and purslane mixed together, and the hands bathed therein, defendeth them from burning, if they be thrust into boyling lead." When steeped in water the leaves of the plant give out a fine blue colour resembling indigo. This colouring-matter is turned red by acids, and destroyed by alkalies, but is otherwise permanent. It might possibly prove valuable as a dye, if any means of fixing the colour could be devised.

SPECIES II.—**MERCURIALIS ANNUA.** *Linn.*

PLATES MCCLXIX. MCCLXX.

Annual. Stem with opposite branches. Leaves shortly stalked, ovate or lanceolate or oval-ovate, the lowest ones not much smaller than those on the middle of the stem. Male flowers in small glomerules,

arranged in interrupted stalked axillary spikes. Female flowers stalked, in few-flowered axillary clusters, rarely intermingled with male flowers. Capsule small, didymous, roughened with large pointed tubercles terminated by bristly hairs; tubercles largest on each side of the central line of each coccum towards its apex. Seeds ovoid, slightly shining, reticulated-shagreened. Leaves green, glabrous.

Var. α , *genuina*.

PLATE MCCLXIX.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CLI. Fig. 4801.

Billot, Fl. Gall. et Germ. Exsicc. No. 76.

M. annua, *Linu. fil. Reich.* Fl. Germ. Excurs. p. 764, and Ic. l. c. p. 9. *Gren. & Godr.* Fl. de Fr. Vol. III. p. 99.

Flowers diœcious.

Var. β , *ambigua*.

PLATE MCCLXX.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CLI. Fig. 4802.

Billot, Fl. Gall. et Germ. Exsicc. No. 642.

M. ambigua, *Linu. fil. Reich.* Fl. Germ. Excurs. p. 764, and Ic. l. c. p. 9. *Bab.* in *E.B.S.* No. 2816.

Flowers monœcious, in other respects undistinguishable from the female plant of var. α .

In gardens, cultivated fields, and by roadsides, chiefly about towns and villages. Local, but generally distributed over the south of England; rare in the north, and very scarce in Scotland, where it occurs near Tranent, East Lothian; Burntisland, Fife; and Aberfoyle, Perthshire. Very local in Ireland, and confined to the south and east of the island. Var. β is chiefly found along the south coast.

England, Scotland, Ireland. Annual. Late Summer, Autumn.

Stem 6 to 20 inches high, usually (especially in the female plant) with numerous opposite branches, the internodes not longer towards the base of the stem than in the middle, all of them with prominent lines from between the stipules of one pair of leaves to the axils of those immediately below them. Leaves in the male plants ovate or ovate-lanceolate, rarely lanceolate; of the female commonly lanceolate and much darker in colour; in both cases rounded or sometimes subcordate at the base, acuminate at the apex, serrate or crenate-serrate; the petioles of the upper leaves rather shorter than the width of the lamina, those of the upper much shorter. Male flowers in interrupted stalked spikes, like those of *M. perennis*: the female plant with axillary fascicles of shortly stalked flowers. Styles diverging, not recurved. Capsule

$\frac{1}{8}$ inch long by $\frac{1}{4}$ broad. Seeds reddish-brown, more or less tinged with grey from the adhesion of the thin outer covering, as in *M. perennis*. When this is rubbed off, the seed appears shagreened instead of reticulated; it is the same in *M. perennis*, but the thin covering adheres much more closely in that species, and is not easy to remove. Plant yellowish-green, the female deep green, usually with the leaves smaller, more lanceolate, with the broadest part close to the base.

Var. β only differs from the narrow-leaved form of the female plant of var. α by having male flowers intermixed with the female. It has remained constant in my garden for three years, but Mr. Borrer and others state that this is not always the case.

Annual Dog's Mercury.

French, *Mercuriale annuelle*. German, *Einjähriges Bingelkraut*.

This plant is eaten in Germany after being boiled; its acrid and poisonous qualities being dissipated, it is believed, by the process. The leaves were formerly used as an emollient, containing much mucilage.

EXCLUDED SPECIES.

EUPHORBIA DULCIS. *Linn.*

Said to have escaped from cultivation about Gordon Castle and Grant Lodge, Moray (Rev. George Gordon). Tullibody, Ochills, introduced, and not native (Professor Balfour in Fl. Ed.).

EUPHORBIA CHARACIAS. *Linn.*

Engl. Bot. ed. i. No. 442.

Said to have occurred in Needwood Forest, Stafford, and in Worcestershire, but no doubt *E. amygdaloides* was mistaken for it.

EUPHORBIA SALICIFOLIA. *Hort.*

This subspecies of *E. Esula* is reported as naturalised in the Mains Flowery Den by Professor G. Lawson, from whom I have a specimen.

EUPHORBIA PEPLOIDES. *Gouan.*

The Rev. W. W. Newbould thinks he has seen British specimens of this subspecies of *E. Peplus*.

ORDER LXIX.—**CALLITRICHACEÆ.**

Small slightly branched herbs, growing in water or on mud. Stems slender, brittle, rooting at the nodes. Leaves opposite, slightly connate, entire or rarely lobed, generally notched at the apex. Flowers monœcious or rarely perfect, sessile, axillary, solitary, very minute, usually bractiate, but the bracts sometimes caducous. Perianth none. Stamens in the male flowers 1; filament elongate; anther 2-celled. Female flowers with a 4-lobed ovary; styles 2, filiform, stigmatiferous throughout. Fruit sessile or stalked, suborbicular, much compressed, 4-lobed and 4-celled, the lobes in pairs, with an impressed line on each face indicating the separation between the two pairs, each pair with a more or less deep furrow between the 2 lobes of which the pair is composed, at length usually splitting into 4 indehiscent cocci. Seeds 4, 1 in each cell of the fruit, pendulous, with a small caruncle at the apex; albumen fleshy; embryo central, straight.

In some of the species flowers with stamens and pistil together have been found, so that its position next Euphorbiaceæ is perhaps unnatural.

GENUS I.—CALLITRICHE. *Linn.*

The only known genus of the order.

The name of this genus of plants is derived from two Greek words, *καλός* (*kalos*), beautiful, and *θρίξ* (*thrix*), the hair.

SPECIES I.—CALLITRICHE VERNÆ. *Linn.*

PLATES MCCLXXI. TO MCCLXXIV.

Leaves linear or oblanceolate or obovate, none of them enlarged at the base, more or less notched at the apex, otherwise entire. Anthers rising out of the water immediately before fertilisation takes place; pollen grains with 2 coats. Marginal furrows of the fruit shallow, not extending nearly to the bottom of the lobes. Stem and leaves furnished with stellate scales. Submerged leaves commonly translucent and 1-nerved, the upper ones generally floating and in a rosette; those exposed to the air opaque, furnished with stomata, and often 3-nerved.

SUB-SPECIES I.—*Callitriche vernalis*.* *Kütz.*

PLATE MCCLXXI.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXIX. Fig. 4746.

C. aquatica, Sm. Engl. Bot. No. 722.

C. verna, Auct. Plur. Hegelm. Monogr. p. 55.

C. pallens, Goldb.

C. cophocarpa, Sendtn. } test. Hegelm.

Pollen grains elliptical. Fruit sessile, longer than broad, subcordate, convex on the faces; marginal furrows shallow; margins of the lobes shortly and sharply keeled; styles erect or spreading, subpersistent.

In ditches and ponds or in mud. Common, and generally distributed.

England, Scotland, Ireland. Perennial. Early Spring to Autumn.

Stems round, slender, varying in length according to the depth of the water in which the plant grows. Leaves when submerged mostly linear; when growing out of the water, obovate; but even when immersed a few of the upper leaves are larger ($\frac{1}{2}$ to 1 inch long), obovate, and with the internodes between them very short, so as to form a floating rosette. Flowers in the axils of the leaves; often there is a female flower on one side of the stem, and a male one opposite to it. Each flower with 2 white membranous strapshaped incurved deciduous bracts at the base. Filament at length very long. Fruit about $\frac{1}{20}$ inch long, and not so broad, pale yellow. Plant pale bright green.

Vernal Water Starwort.

French, *Callitriche printanière*. German, *Frühlings Wasserstern*.

The common starwort is one of the most interesting of our British water-plants. In the early spring, and even in the winter, its bright green stellate leaves are striking objects in deep ditches and ponds. The under surface of these leaves is studded with numerous gland-like bodies having a circular rosette form. They can be easily seen by the low powers of the microscope, but are not visible to the naked eye, giving only a whitish glistening aspect to the under surface of the leaves. They were first described by Dr. Lankester at a meeting of the British Association held in Edinburgh in 1850, and afterwards in the proceedings of the Linnæan Society. These gland-like bodies consist of from four to eight distinct cells surrounding a central cell, which is attached to the cellular tissue of the leaf below. At first these little cells are filled with fluid, but as the plant gets older, and the period of inflorescence arrives, they are filled with air. The function performed by these little bodies is undoubtedly that of lightening the leaf, and thus enabling the whole plant to lift itself in the water. In this respect their function is analogous to the vesicles found in *Utricularia*, and to the intercellular spaces found in the leaves of *Nymphaea* and *Nuphar*, and to the stellate cellular tissue of *Juncus* and other plants growing in water. A question has been raised as to whether they are homologous with hairs or

Erroneously named *Callitriche eu-verna* on Plate MCCLXXI.

stomates. Similar bodies have been described by Dr. Dickie in the leaves of *Pedicularis*, and Professor Busk discovered them in small numbers in the leaves of *Hippuris vulgaris*. On the one hand, they undoubtedly resemble the stellate hairs found in *Capsella Bursa Pastoris* and other Cruciferous plants, whilst their resemblance to some of the compound forms of stomates has struck other observers. M. Ad. Chrétien, in a paper in the *Comptes Rendus*, vol. xl., is disposed to regard them as independent organs, and calls them "cystides." He thinks, however, that they are rather modifications of stomates than of hairs. These curious organs demand more attention than they have hitherto received, and would probably repay the microscopist by further researches amongst the species of plants in which they exist.

SUB-SPECIES II.—*Callitriche platycarpa*. Kütz.

PLATE MCCLXXII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXIX. Fig. 4748.

C. stagnalis, *Hegelm.* Monogr. p. 58 (non *Scop.*?).

Pollen grains subglobose. Fruit subsessile or shortly stalked, as long as or a little shorter than broad, subcordate, flattish on the faces; marginal furrows rather deep; margins of the lobes rather broadly and sharply keeled. Styles at length reflexed, persistent.

In ditches, ponds, and on mud. Common, and generally distributed.

England, Scotland, Ireland. Perennial. Spring to Autumn.

Very similar to *C. vernalis*, but with the fruit nearly twice as large, $\frac{1}{16}$ inch long, and considerably broader in proportion, with a deeper furrow round the margins, generally with a slight tendency to become stalked when mature, and of the same pale colour as that of the last; the leaves are very similar, and the floating rosette is almost always present; when the plant grows out of the water the leaves are frequently all obovate, but smaller than when they are floating.

Dr. Hegelmaier considers that *C. stagnalis* of Scopoli, which has the lobes of the fruit divaricate, is not different from the *C. platycarpa* of Kützing, in which the lobes are subparallel, and in that case the name *C. stagnalis* must be adopted for this subspecies. The form with divaricate lobes has not been observed in Britain, so far as I am aware.

Large-fruited Water Starwort.

French, *Callitriche à fruits larges*. German, *Breitfrüchtiger Wasserstern*.

SUB-SPECIES III.—*Callitriche hamulata*. Kütz.

PLATE MCCLXXIII.

Reich. Ic. Fl. Germ. et Helv. Vol. V. Tab. CXXX. Fig. 4749.

Billot, Fl. Gall. et Germ. Exsicc. No. 356. *Hegelm.* Monogr. p. 56.

C. autumnalis, Kütz. *Reich.* Fl. Germ. Excurs. p. 754 (non *Linn.*).

C. pedunculata, β , sessilis, *Bab. olim*.

Pollen grains subglobose. Fruit sessile or subsessile, as long as or a

little shorter than broad, subcordate, flattish on the faces; marginal furrows shallow, increasing in depth regularly from the keels of the lobes to the line of separation between them; margins of the lobes with short wide keels, the section of which is nearly a right angle. Styles very long, at length reflexed and adpressed, deciduous.

In ditches, ponds, and lakes, more rarely on mud. Not uncommon, and generally distributed.

England, Scotland, Ireland. Perennial. Summer, Autumn.

A very variable plant, sometimes with the upper leaves obovate or oblanceolate, at other times with them all linear and submerged. Bracts much incurved, very deciduous. Fruit about $\frac{1}{20}$ inch long, olive.

Professor Babington suggests that the bracts are perhaps confined to the male flowers, but they are so very deciduous that, unless observed when the flowers are very young, the plant appears to have no bracts at all.

When submerged the plant is more olive in colour than the preceding, and the leaves more translucent; it never has, however, the deep green leaves of *C. autumnalis*, and the fruit is very different.

I have not seen this subspecies growing out of the water, but Dr. Hegelmaier infers that this sometimes takes place, as he states that "land forms are not abundant."

Hooked Water Starwort.

French, *Callitriche en crochet*. German, *Hakenförmiger Wasserstern*.

SUB-SPECIES (?) IV.—***Callitriche pedunculata***. *D.C.*

PLATE MCCLXXIV.

Negeln. Monogr. p. 57.

C. hamulata, β , *Bab. Man. Brit. Bot.* ed. vi. p. 304.

C. autumnalis, *Hook.* in *E.B.S.* No. 2606 (non *Linn.*).

Pollen grains subglobose. Fruit sessile or more or less conspicuously stalked, as long as or a little shorter than broad, subcordate, flattish on the faces; marginal furrows shallow, nearly as deep close to the keels of the lobes as in the line of separation between them; margins of the lobes with short slender keels, the section of which is an acute angle. Styles rather long, at length reflexed and spreading, caducous.

In ponds and ditches, but much more frequently on mud or in damp places. Common, and generally distributed.

England, Scotland, Ireland. Perennial. Spring, Autumn.

C. pedunculata is probably only a variety of *C. hamulata*, growing

on land or in shallow water, but I keep it distinct on the authority of Dr. Hegelmaier, who considers it so on account of its flowering at an earlier date than *C. hamulata*. It appears to be a form more confined to the south and west of Europe than any of the preceding. The leaves of *C. pedunculata* seem to be always strapshaped, never oblanceolate or obovate.

The only other subspecies of *C. verna* which is likely to occur in Britain is *C. obtusangula*, *Le Gall.*, which has the lobes of the fruit with an evanescent furrow between them, and the angles of the lobes completely rounded off, but in other respects it closely resembles *C. vernalis*.

Pedunculated Water Starwort.

SPECIES II.—**CALLITRICHE AUTUMNALIS.** *Linn.*

PLATE MCCLXXV.

Reich, Ic. Fl. Germ. et Helv. Vol. V. Pl. CXXX. Fig. 4749 b.

Leaves strapshaped or lanceolate-strapshaped, generally enlarged at the base, notched at the apex. Anthers always submerged; pollen grains with a single coat. Marginal furrows of the fruit deep, extending to the bottom of the lobes. Stem and leaves destitute of stellate scales; the leaves all submerged, translucent, 1-nerved, and destitute of stomata.

In lakes. Rare. Llyn Maelog, Anglesea; pond in Tabley Park, Cheshire (Hon. J. L. Warren). In Scotland it occurs in several lakes, but I have gathered it in only Loch Gelly, Fife, and Loch of Drum, near Aberdeen. In Ireland it grows at Cong, and a little to the east of Foxford, co. Mayo; also near Lough Neagh, cos. Derry and Antrim.

England, Scotland, Ireland. Perennial. Summer, Autumn.

Plant wholly submerged, with brittle yellowish stems and very dark green translucent leaves, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, resembling in texture those of *Potamogeton pusillus*; these leaves are usually rounded at the base and taper slightly towards the apex, but sometimes they are nearly the same width throughout. The fruit is $\frac{1}{10}$ to $\frac{1}{8}$ inch long, dark olive when dry, with very broad membranous wings, and the lobes being divided nearly to the base, it is impossible to mistake this species when in fruit for any of the forms of *C. verna*.

The British specimens which I have examined, viz. those from Anglesea, Cheshire, Fife, Aberdeen, and Perth, all belong to a subspecies, *C. eu-autumnalis* [*C. autumnalis*, Auct. *Hegelm.* Monogr. p. 61]. In this plant the fruit is sessile or subsessile; the margins of the lobes have a broad sharp winglike keel. Another subspecies, *C. truncata*, *Guss.*, has the fruit sessile or more or less distinctly stalked, and the

margins of lobes rounded without any keel or wing. Although *C. truncata* is mainly a southern form, yet as it occurs as far north as Belgium it is possible that, in some of the British stations recorded for *C. autumnalis*, *C. truncata* may yet be found.

Autumnal Water Starwort.

German, *Herbst Wasserstern.*

ORDER LXX.—CERATOPHYLLACEÆ.

Small diffusely branched rigid brittle herbs, growing in water and entirely submerged. Leaves sessile, verticillate, wedgeshaped, dichotomously cleft into numerous slender acute segments. Flowers monœcious, sessile, axillary, solitary, very minute, bracteate, with an involucre cut into 10 or 12 segments. Perianth none. Stamens in the male flowers 12 to 20; anthers sessile, 2-celled. Female flowers with a 1-celled ovary; ovules solitary, pendulous, orthotropous; style single; stigma filiform, oblique. Fruit a 1-seeded indehiscent nut, tipped with the hardened style. Seed solitary; albumen none; embryo with 2 cleft cotyledons; radicle inferior.

GENUS I.—CERATOPHYLLUM. *Linn.*

The only known genus of the order.

The derivation of the name of this genus of plants is from *κέρας* (*keras*), a horn, and *φύλλον* (*phullon*), a leaf, the leaves being supposed to resemble little horns.

SPECIES I.—CERATOPHYLLUM AQUATICUM. *Wats.*

In Lond. Cat. ed. vi.

PLATES MCCLXXVI. MCCLXXVII.

C. demersum, *Benth.* Handbk. Brit. Bot. ed. ii. p. 12 (non *Linn.*).

The only known species.

SUB-SPECIES I.—*Ceratophyllum demersum*. *Linn.*

PLATE MCCLXXVI.

Billot, Fl. Gall. et Germ. Exsicc. No. 3084.

Fruit smooth, with a spine on each side near the base, and tipped with a long curved subulate style.

In ponds and ditches. Rather common in the south of England;

rare in the north, but extending to Forfarshire. Rare, but widely distributed in Ireland.

England, Scotland, Ireland. Perennial. Late Summer, Autumn.

Stems wholly submerged, branched 1 to 3 feet long, densely clothed with whorled spreading leaves. Leaves 8 in a whorl, repeatedly forked, with the segments slender, rough at the edges. Fruit, which is rarely seen, about $\frac{1}{4}$ inch long, ovoid, with 2 subulate spines at the base, and a longer curved one at the apex. Plant dark lurid green, rigid.

Common Hornwort.

French, *Cornifle submergé*. German, *Rauher Igellock*.

SUB-SPECIES II.—*Ceratophyllum submersum*. Linn.

PLATE MCCLXXVII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1992.

Fruit when ripe covered with cylindrical tubercles, destitute of spines at the base, and tipped with a curved subulate style.

In ponds and ditches in the south and east of England. Rare.

England. Perennial. Late Summer, Autumn.

Very similar to *C. demersum*, but with the segments of the leaves narrower and not serrulate; the fruit without spines or tubercles at the base, and, when mature (which I have seen only from St. Osyth, Essex), clothed with cylindrical tubercles, but smooth when young. There is certainly no constant difference in the foliage accompanying the absence of lateral spines in the fruit, and as this is rarely produced, it is impossible to say to which subspecies the greater number of British specimens belong. The fruit of all the *Ceratophylla* need never be looked for in deep water where the plants grow luxuriously.

Besides these two subspecies there are two others found on the Continent, which are likely to occur in Britain; viz. *C. platyacanthum*, Chamisso, differing from *C. demersum* in the spines at the base of the fruit being compressed and winged at the bottom, and *C. apiculatum*, Chamisso, differing from *C. submersum* only in having 2 tubercles at the base of the fruit: these tubercles are evidently the rudiments of the spines of *C. demersum*, and consequently connecting the two supposed subspecies.

Unarmed Hornwort.

German, *Glatte Igellock*.

ORDER LXXI.—**URTICACEÆ.**

Herbs, shrubs, or trees, with alternate or opposite, generally scabrous or hairy, leaves, the hairs sometimes stinging. Stipules more or less conspicuous, usually deciduous in the arborescent genera, rarely wanting. Flowers variously disposed, usually diœcious or monœcious, rarely perfect. Perianth single, commonly herbaceous, regular, free from the ovary. Stamens as many as the lobes of the calyx, more rarely fewer or more numerous, inserted in the bases of the calyx lobes and opposite to them. Ovary free from the calyx, 1-celled, rarely 2-celled; ovules 1 in each cell of the ovary, anatropous or amphitropous, pendulous or suspended; style single or 2 when the ovary is 2-celled. Fruit a 1-seeded achenium or samara. Seed solitary, with or without albumen.

SUB-ORDER I.—**URTICEÆ.**

Flowers monœcious or diœcious or polygonous, not arranged on a fleshy clinanth nor spadix. Filaments transversely wrinkled and incurved in bud, spreading with elasticity when the pollen is ready to be shed. Ovary 1-celled, with a single suspended orthotropous ovule; style or stigma 1, simple. Fruit an achene; embryo straight, in the axis of albumen; radicle remote from the hilum.

GENUS I.—PARIETARIA. Tournef.

Flowers polygamous. Perfect flowers with the perianth 4- or 5-partite, the segments nearly equal: stamens as many as the segments of the perianth; ovary free; style very short; stigma multifid. Unisexual flowers differing from the perfect ones only by the ovary being abortive in the male flowers, or the stamens abortive in the female flowers. Achene enclosed in the tube of the perianth, which often elongates after flowering.

Herbs or undershrubs with the leaves alternate or opposite. Flowers axillary, in cymose-fasciculate sessile clusters, contained in a 2-leaved involucre, each half of which is multipartite, and consists of the bracts of half of a contracted cyme; between the 2 halves of the involucre there is a flower, which is usually female. Plants glabrous or hairy, but the hairs are never stinging.

The name of this genus of plants is derived from the word *paries*, a wall, because it grows on old walls.

SPECIES I.—**PARIETARIA DIFFUSA.** Koch.

PLATE MCCLXXVIII.

*Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLI. Fig. 1318.**P. officinalis, Sm. Engl. Bot. No. 879.*

Stems prostrate or ascending, rarely erect, commonly branched. Leaves oval or elliptical, slightly acuminate, 3-nerved about the base. Each half of the involucre 3- to 6-cleft, containing 1 to 3 flowers. Perianth of the perfect flowers bellshaped-cylindrical, elongating after flowering until it is nearly twice as long as the stamens.

Var. α , *genuina*.*P. diffusa, Bab. olim.*

Stems decumbent, usually much branched.

Var. β , *fallax. Gren. and Godr.**P. erecta, Bab. olim (non Koch.).*

Stems erect, usually nearly simple.

On stony banks, rocks, and old walls and hedgebanks. Rather common in England. Rather rare in Scotland, and absent from the north of that country. Frequent and generally distributed in Ireland.

England, Scotland, Ireland. Perennial. Summer, Autumn.

Stems numerous, almost woody at the base, succulent at the apex, purplish, streaked with green, usually much branched, but sometimes nearly simple. Leaves 1 to 3 inches long, tapering gradually into the short petioles, entire, without stipules. Involucre with 2 principal lobes cut into several segments, containing a variable number of flowers, the central flower female, placed between the 2 halves of the involucre. Perianth of the lateral flowers elongating to about $\frac{1}{8}$ inch and becoming reddish-brown, rarely pale brown, with green-lipped segments. Seeds $\frac{1}{20}$ inch long, ovate-ovoid, compressed, black, shining. Plant pubescent, the leaves dark green and somewhat scabrous, with small raised points, hairy on both sides.

The elongated tubular perianths of the fertile flowers distinguish *P. diffusa* from *P. erecta, Koch*, which is a much stouter plant, with nearly simple stems and more rhombic leaves.

*Pellitory of the Wall.*French, *Pariétaire.* German, *Ausgebreitetes Glaskraut.*GENUS II.—**URTICA.** Tournef.

Flowers monœcious or diœcious. Male flowers with the perianth 4- or 5-partite, the segments nearly equal: stamens as many as the

segments of the perianth. Female flowers with the perianth of 4 sepals, the 2 outer ones very small or abortive: ovary free; stigma sessile, multifid, or filiform. Achene ovoid, compressed, naked or enclosed in the more or less enlarged perianth.

Annual or perennial herbs, with opposite leaves, and small persistent stipules. Flowers sessile, in spikes, rarely in globular heads, on the branches of axillary panicles. Leaves and stem generally with stinging hairs.

The name of this genus of plants is derived from the Latin word *uro*, I burn, from the uneasy burning sensation produced by the sting of the species.

SPECIES I.—**URTICA DIOICA.** *Linn.*

PLATE MCCLXXIX.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLIV. Fig. 1324.

Billot, Fl. Gall. et Germ. Exsicc. No. 457.

Perennial. Rootstock creeping, with fleshy stolons. Leaves opposite, ovate or lanceolate, cordate or rounded at the base, acuminate or acute, coarsely serrate or inciso-serrate, on petioles shorter than the breadth of the lamina. Flowers diœcious. Male and female flowers in glomerules arranged in elongated slightly interrupted spikes, which are combined into branched panicles; panicles in pairs, longer than the petioles of the leaves; branches of the panicle of the male plants ascending or spreading, those of the female plants recurved. Fruit glomerules minute, few-flowered, not globular. Fruit sepals concave, none of them conspicuously hooded. Plant with stinging hairs.

In waste ground, hedgebanks, by roadsides, &c. Very common, and generally distributed.

England, Scotland, Ireland. Perennial. Late Summer, Autumn.

Stem erect, 18 inches to 4 feet high, simple or more rarely branched. Leaves 2 to 4 inches long, variable in breadth, somewhat rugose, from the longitudinal veins being deeply impressed above, but not distinctly so, as the tertiary veins are not so deeply impressed; serratures of the margins variable in depth, with the outer margin curved, so that the point is directed towards the apex of the leaf, the basal ones smaller than the others. Petiole not more than as long as, and often shorter, than the breadth of the leaves. Stipules strapshaped, rather small. Panicles 1 to 3 inches long. Male spikes slender, female rather dense. Nut ovate-ovoid, compressed, olive, nearly smooth, slightly shining, enclosed in the enlarged and connivent inner sepals. Plant hairy; the stem and leaves on both sides furnished with stout stinging hairs. Leaves dull dark green, paler beneath.

Common Nettle.

French, *Ortie dioïque*. German, *Zweihäusige Nessel*.

The common name of this plant, familiar to everybody, is said by Dr. Prior "to have meant primarily that with which one sews; and it is, indeed, almost identical with *needle*. Applied to the plant now called so, it indicates that this supplied the thread used in former times by the Germanic and Scandinavian nations, which we know as a fact to have been the case in Scotland in the seventeenth century. Westmacott says, "Scotch cloth is only the housewifery of the nettle." In Friesland also it has been used till a late period. "Flax and hemp bear southern names, and were introduced into the north to replace it." Everyone knows by experience the peculiarity of the nettle—the numerous little hairs which beset its leaves, furnished with conical receptacles at the base, each exuding an acrid fluid, which, when touching the skin, inflicts a sharp pain, and produces often considerable inflammation. From this fact it is called the stinging nettle, to distinguish it from the *dead nettles* species of *Lamium*, which somewhat resemble it in leaves and stem.

The leaves of the nettle when young make a good potherb, and were at one time eaten largely, when green vegetables were less abundant than they now are in our gardens. In Scotland it was the practice to "force the nettles for early spring kail," and we are told the nettles dressed like spinach are excellent eating. By earthing-up, nettles may be blanched in the same way as sea-kale, and eaten in a similar manner. Cattle usually refuse to eat nettles when fresh gathered or growing; but when dried and made into hay, so as to destroy the poisonous matter of the stings, cows will relish them, and give more milk than when fed on hay alone. The leaves, chopped and mixed with other food, are said to be beneficial to young turkeys and other poultry.

The juice of nettles yields a beautiful and permanent green dye, which is used for woollen stuffs in Russia. The roots, boiled with alum, produce a yellow colour, which dyes yarn well, and is also employed to stain eggs yellow preparatory to the feast of Easter by the religious of the Greek Church. Not only are nettles esteemed as an article of food, but the plant yields one of the best of vegetable fabrics for textile purposes. Campbell, complaining of the little attention paid to it in England, says: "In Scotland I have eaten nettles, I have slept in nettle-sheets, and I have dined off a nettle-tablecloth. The young and tender nettle is an excellent potherb. The stalks of the old nettle are as good as flax for making cloth. I have heard my mother say, that she thought nettle-cloth more durable than any other species of linen." The fibre being produced in less quantities than that of flax, and being somewhat difficult to extract, accounts perhaps for the fact that it is but little used in Britain, though in some countries it is still employed. An extraordinary application of nettles is recorded by Goldsmith, who states that "capon may very easily be taught to clutch a fresh brood of chickens throughout the year. The manner of teaching them is this. The capon being made very tame, about evening pluck the feathers of his breast, and rub the bare skin with the nettles; then put the chickens under him, which presently run under his breast, and rubbing the bare skin gently with their heads, allay the stinging smart which the nettles had produced. This is repeated a few nights, till the capon takes an affection to the chickens that have thus given him relief, and continues to afford them the protection they seek. From that time the capon brings up the chickens like a hen, performing all the functions of the tenderest parent." Medicinally, the juice of the nettle acts as a slight astringent. It was recommended by the

old writers on herbs as a styptic, and seems to be useful in arresting bleeding of the nose. With this view, a small piece of lint moistened with the juice may be placed in the nostril. An infusion, known as "nettle tea," is a common spring medicine in many rural districts, and is thought to purify the blood. Carden recommended stinging with nettles "to let out melancholy," an advice also given by some other old writers. Bacon with reason says, "We have no good opinion of it, lest through the venomous qualities of the nettle it may, with often use, breed disease of the skin."

SPECIES II.—URTICA PILULIFERA. *Linn. Hook. & Arn.*

PLATES MCCLXXX. MCCLXXXI.

Annual. Leaves opposite, ovate or lanceolate-ovate, truncate or rounded or subcordate at the base, acute, deeply inciso-serrate or more rarely entire, on petioles as long as the breadth of the lamina or longer. Flowers monœcious. Male flowers in large glomerules, placed along at the extremity of the branches of lax panicles, generally equalling or exceeding the petioles of the leaves; female flowers in dense globular heads on solitary or branched peduncles, in pairs, shorter than the petioles of the leaves; branches of the male panicle ascending; peduncles of the female (except when they are terminated by a panicle of male flowers) spreading. Fruit-heads large, many-flowered, globular. Inner fruit sepals concave, much hooded. Plant with stinging hairs.

Var. α, genuina.

PLATE MCCLXXX.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLIII. Fig. 1302.

U. pilulifera, Linn. Spec. Pl. p. 1395. Reich. Ic. l. c. p. 10. Bab. olim.

Leaves inciso-serrate.

Var. β, Dodartii.

PLATE MCCLXXXI.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLIII. Fig. 1303.

U. Dodartii, Linn. Spec. Pl. p. 1395. Reich. Ic. l. c. p. 10. Bab. olim.

Leaves entire or nearly entire.

By roadsides and in waste places near towns and villages in the east of England, but doubtfully native. The only places where I know it to be permanent in its stations, are by the side of the fish-houses, Lowestoft, Suffolk; Great Yarmouth, Norfolk; and perhaps at Copford, Essex, where both vars. *α* and *β* occur. It has occurred in, or been reported from, the counties of Cornwall, Hants, Kent, Surrey, Middlesex, Cambridge, Stafford, Salop, Glamorgan, Anglesea, Lancaster, Durham, Northumberland; but I cannot discover that it has remained

permanently established in any of these localities. In Ireland it has been found near Bantry and Carberry, but doubtless introduced.

[England, Ireland.] Annual, [Biennial or Perennial. *Gren. & Godr.*] Late Summer, Autumn.

Stem 1 to 3 feet high, erect, simple, or branched. Leaves $1\frac{1}{2}$ to 4 inches long, on much longer petioles than those of *U. dioica*, which they otherwise closely resemble. Stipules ovate, much broader than those of *U. dioica*; the chief difference, however, lies in the inflorescence, which, in the case of the female flowers, is not collected into spikes, but forms rounded heads, which in fruit become globular and as large as a black currant. The inner sepals also are much larger and turned over at the apex. The seed is pitchy brown, longer in proportion and much larger than that of the common nettle.

The var. δ has a very different aspect from the leaves being entire, but is not constant in this when raised from seed, and very frequently individuals occur with the leaves entire and serrate, or partially serrate. Mr. H. C. Watson, in his "*Cybele Britannica*," vol. ii. p. 370, was the first to point out the impossibility of separating the two as distinct species.

Roman Nettle.

French, *Ortie à pilules*. German, *Pillenträgende Nessel*.

A curious story is told by Camden of this species. He writes: "That when Julius Caesar landed at Romney, the soldiers brought some of the nettle seed with them, and sowed it there for their use, to rub and chafe their limbs, when, through extreme cold, they should be stiff and benumbed, being told before they came from home that the climate of Britain was so cold that it was not to be endured without some friction to warm their blood."

SPECIES III.—*URTICA URENS*. *Lin.*

PLATE MCCLXXXII.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLII. Fig. 1320.

Billot, Fl. Gall. et Germ. Exsicc. No. 457.

Annual. Leaves opposite, oval, rounded or truncate at the base, subobtuse or subacute, deeply inciso-serrate, on petioles usually as long as the breadth of the lamina. Flowers monœcious. Male and female flowers intermixed, in glomerules arranged in short simple spikes; female flowers the most numerous; spikes in pairs, shorter than the petioles of the leaves, ascending or spreading. Fruit glomerules minute, few-flowered, not globular; fruit sepals concave, none of them hooded. Plant with stinging hairs.

A weed in cultivated ground, and in waste places and by roadsides. Common, and generally distributed.

England, Scotland, Ireland. Annual. Summer, Autumn.

Stem erect, commonly much branched, 9 inches to 2 feet high. Leaves 1 to 3 inches long, with the widest part nearer the middle than in the other British nettles, and with the lateral veins from the base slightly converging towards the midrib before they disappear; teeth few, very large and sharp. Spikes $\frac{1}{4}$ to 1 inch long; some of the flowers stalked. Seeds similar to that of *U. dioica*, but a little larger, and scarcely so broad in proportion. It is of a brighter green than the other British nettles, and is also more glabrous, having scarcely any hairs except the stinging ones.

Small Nettle.

French, *Ortie brûlante*. German, *Brennende Nessel*.

SUB-ORDER II.—CANNABINÆ.

Flowers diœcious, not arranged on a fleshy clinanth nor spadix. Filaments short, not inflexed in bud. Ovary 1-celled, with a single erect orthotropous ovule; stigmas 2. Fruit an achene. Albumen none; embryo hooked or coiled; radicle near the hilum.

GENUS III.—CANNABIS. *Tournef.*

Flowers diœcious. Male flowers with the perianth of 5 nearly equal sepals: stamens 5, pendulous. Female flowers each in the axil of a minute bract: perianth split on one side and resembling a spathe, and enfolding the ovary: style short; stigmas 2, elongate and filiform. Achene indehiscent, but the 2 valves separating on pressure; embryo hooked, but the cotyledons not rolled up spirally.

An erect annual herb, with opposite stalked digitate leaves, with 5 to 7 leaflets, the upper leaves with fewer. Male flowers in a lax terminal panicle; female flowers sessile, in glomerules in the axils of the leaves and in a spike at the apex of the stem.

The name of this genus of plants is derived from the Greek word *κάνναβις* (*kannabis*), which is supposed to be the Arabic name for the hemp.

SPECIES I.—CANNABIS SATIVA. *Linn.*

PLATE MCCLXXX.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLV. Fig. 1325.

The only known species.

In waste places and cultivated ground. Frequent about towns, especially in localities frequented by bird-catchers, but not permanently naturalised.

[England.] Annual. Summer, Autumn.

Stem 1 to 3 feet high, simple or branched; in the female plant usually stouter and taller than in the male. Leaves opposite, stalked, digitate, with 5 to 9 narrowly elliptical-lanceolate, acuminate, acute, serrate segments. Stipules small, subulate, free. Male flowers in lax axillary panicles, and in a naked terminal panicle; the axillary ones and the branches of the terminal one commonly in pairs. Female flowers in axillary and terminal glomerules. Achene (the well-known hempseed) brownish-grey, enclosed in and concealed by the calyx. Plant green, the female darker than the male; leaves scabrous and glandular; the stem, especially in the upper part, puberulent.

Common Hemp.

French, *Chanvre cultivé*. German, *Gemeiner Hanf*.

This plant is originally a native of India and Persia, and is generally cultivated, although it is only in hot dry climates that it forms the resin which gives it such value in the estimation of the natives, apart from its fibre-producing qualities. The dried plant, or portions of it, are sold in the bazaars of India under the name of Bhang and Gunjah, while the resin itself is known as Churras. This resin is collected during the hot season in the following singular manner:—Men clad in leather dresses run through the hemp fields, brushing through the plants with all possible violence. The soft resin adheres to the leather, and is subsequently scraped off, and kneaded into balls. In Nepal, according to Dr. McKinnon, the leathern attire is dispensed with, and “the resin is gathered on the skin of the naked coolies!” Gunjah is smoked like tobacco; Bhang is not smoked, but pounded with water into a pulp so as to make a drink; both are stimulants, and intoxicating; but the Churras or resin possesses much more powerful properties. In small quantities it produces pleasant excitement, which passes into delirium and catalepsy, if the quantity be increased; if still continued, a peculiar form of insanity is produced. Many of the Asiatics are passionately addicted to the use of this means of intoxication, as the names given to the hemp show—“leaf of delusion,” “increase of pleasure,” “cement of friendship:” and Captain Burton, a recent traveller in the East, describes this plant as “growing before every cottage door.” The Arabs smoke the undried leaf with, and the Africans without, tobacco in huge pipes. It produces a violent cough, ending in a kind of scream, after a few long puffs, when the smoke is inhaled; and if one man sets the example, the others are sure to follow it. These grotesque sounds are probably not wholly natural. Even the boys may be heard practising them, as an announcement to the public that the fast youths are smoking Bhang. In many parts of Asia the use of narcotic hemp has long been known. In the wars with the Crusaders men were found intoxicated with this drug, which the Saracens called Hashash or Husheesh, and rushing into the camps of the Christians, committed great havoc, being totally regardless of death; they were termed Hashhasheens, whence our word *assassin*. Of whatever country hemp is native, it is certain it was known in Europe in very early times, for Herodotus, writing upwards of 2000 years ago, mentions it as being cultivated by the Scythians, who used its fibre for making their garments. At the present day it is cultivated in most parts of Europe, in Arabia, Persia, India, China, and in America. Russia and Poland are, however, the two great hemp-producing countries, and it is from them that our supply in England is mainly derived; but the best quality

is produced in Italy. For the production of good fibre the seed is sown close, so as to produce straight stems without branches. The harvesting takes place at two periods, the male plant being pulled up as soon as it has done flowering, and the female not until the seeds are ripe. After pulling, the leaves are struck off with a wooden sword, the stems are then tied in bundles, and steeped in water, or water-retted, as it is technically termed (the other processes, dew-retting and snow-retting, are sometimes substituted), the object being to loosen the fibre. They are then spread out to dry and bleach; this is called grassing; after which the fibre is detached, either by pulling it off by manual labour, or by breaking the stems in a machine, and afterwards scutching them in a similar manner to that employed for the preparation of flax. The uses of hemp in making cordage, canvas, and the material known as brown holland, are well known. The seeds, or more properly the fruits containing the seed, are used for feeding cage birds. The imports of hemp in 1858 amounted to 739,339 cwts., the computed real value of which was 1,034,277*l.*, and of hemp-seed 11,090 qrs., value 24,074*l.*

GENUS IV.—**HUMULUS.** *Linn.*

Flowers diœcious. Male flowers with the perianth of 3 to 5 nearly equal sepals: stamens 5, erect. Female flowers in pairs in the axil of a bract, which enlarges much after flowering: perianth of 1 leaf, scalelike, embracing the ovary: style very short; stigmas 2, elongate and subulate. Achene indehiscent. Embryo with the cotyledons rolled up spirally.

Perennial twining herbs, with opposite stalked palmately cut leaves resembling those of the vine, but rough and with united stipules. Male flowers in lax terminal and axillary panicles; female flowers in conelike catkins, of which the bracts after flowering become large and foliaceous, and at length subscarious.

The name of this genus of plants is derived from the word *humus*, the ground, as, unless supported or trained, the species fall to the earth.

SPECIES I.—**HUMULUS LUPULUS.** *Linn.*

PLATE MCCLXXXIV.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLVI. Fig. 1326.

Billot. Fl. Gall. et Germ. Exsicc. No. 2741.

Petioles not longer than the lamina of the leaf. Axis of male panicle straight. Scales of female catkin without resinous dots, otherwise glabrous.

In damp woods and thickets, and in hedgerows. Not uncommon, and generally distributed in the south of England; more rare in the north, where it is probably not indigenous, as Mr. Baker, in his "North Yorkshire," states that "the heat of the summers of the low country is usually not intense enough to properly ripen the seeds." In Scotland

it has no claim to be considered native; and though widely distributed in Ireland, the authors of the "Cybele Hibernica" "believe it to be a relic of ancient cultivation in all the localities where it now occurs."

England, [Scotland, Ireland.] Perennial. Late Summer.

Stems herbaceous, tough, angular, twisted, twining, often attaining a length of several yards. Leaves opposite, stalked, palmately veined, cordate, commonly with 5 lobes, the smaller leaves with 3; lobes divided about half-way down, ovate, acuminate or cuspidate, coarsely serrate or crenate-serrate: more rarely the leaves are undivided, ovate, acuminate, deeply cordate and coarsely serrate. Stipules united between the leaf-stalks so as to appear 2 instead of 4. Flowers diœcious. Male flowers in axillary and terminal lax panicles with divaricate branches: bracteoles resembling the stipules, but smaller: perianth segments slightly unequal, oval-oblong, concave, yellowish-green, with scarious margins: anthers longer than their filaments, yellowish-green, apiculate. Female flowers in small headlike spikes in axillary or terminal panicles, the spikes sometimes solitary on axillary peduncles: perianth a small scale: stigmas 2, elongated. In fruit the scales of the perianth become greatly enlarged, and the spike becomes a large conelike catkin, with ovate or roundish-ovate, blunt, yellowish or sometimes reddish scales. Achene rarely ripened (perhaps from the male and female plants not always growing together), about the size of rape-seed, roundish, apiculate, with a loose membranous pericarp, sprinkled, as well as the now scarious base of the perianth, with yellowish resinous dots. Leaves deep green, scabrous with small tubercles, some of which are produced into minute prickly bristles; angles of the stem, petioles, and undersides of the veins of the leaves, with small reflexed bristles, and underside of the leaves sprinkled with small resinous dots like those on the perianth, scale, and fruit.

Common Hop.

French, *Houblon grim pant*. German, *Gemeiner Hopfen*.

The hop is familiar to us all in cultivation, but is not so well known as a wild plant of our hedges. It is, however, to be seen in many localities, and is always an attractive object. It was well known to the Romans, and is mentioned by Pliny under the name of *Lupus salictarius*. It gradually spread through Europe during the Middle Ages, but was not cultivated in England till the year 1524, when it was introduced from Flanders, though not without violent opposition, petitions against it being presented to Parliament, in which it was stigmatised as a "wicked weed, that would spoil the drink and endanger the people." From the name, which seems to be derived from the Saxon *hoppian*, to climb, some have inferred that it must be a native plant; but it bears the same name in Holland, whence it was brought to this country. William King, in his "Art of Cookery," remarks that "heresy and hops came in together;" while an old popular rhyme records that

"Hops, carp, pickerel, and beer,
Came into England all in one year."

This may hold good if beer is necessarily made with hops; but long before this time beer had been brewed in England without hops, other wild plants being added to it. This beverage always went by the name of ale, derived from the northern öl, applied by the Scandinavians to the strong beverages quaffed by the deep-drinking Vikings, brewed either from malt alone or with a mixture of honey, and flavoured with heath tops, germander, and various other aromatic herbs. The controversy as to the use of hops in the manufacture of beer, seems to have waxed hot at the time of their introduction into England. The citizens of London protested in a body against "Newcastle coals in regard of their stench, and hops in regard of their taste." Tusser, in his "*Hondreth Good Points of Husbandrie*," published in 1557, gives sundry directions for the cultivation of hops, and advocates their use. He says:—

"The hop for his profit I thus do exalt,
It strengtheneth drink, and it savoureth malt;
And being well brewed, long kept it will last,
And drawing abide—if you draw not too fast."

Before the close of the sixteenth century the hop was cultivated in southern England, and it was generally accepted as an addition to our agriculture.

The hop plant requires a rich deep soil for its profitable cultivation, and the subsoil should be well drained; while a southern aspect is supposed to be favourable to a good crop of catkins. The plants are obtained by taking off the young shoots which are thrown up from the old roots, and planting them in beds till they are sufficiently grown for removal to the hop-ground. When the plants attain a sufficient size, poles twelve feet or more in length are stuck near each, and the stems, or "bines," tied to them till they begin to hoist of their own accord. It is curious to observe how every plant invariably winds to the right, and no force is able to change this natural inclination. The first year of planting, the crop is generally small, and not worth gathering; it improves the second year; but the third year should find the plants in full bearing. The hop, being diœcious, the fertile and barren flowers being on different plants, it is necessary that some of the stamen-bearing plants should be grown in the neighbourhood of the others. Some growers depend on the pollen being conveyed by wind or insects from the wild plants of the hedges, but it is not safe to trust to this. The hop plant is peculiarly liable to the attacks of insects, and is greatly dependent on the weather, so that the crop is very uncertain and precarious, but under favourable circumstances from eight to fourteen cwt. per acre is yielded, and sometimes even more in good seasons, and where the plants are well manured. The crop usually ripens in September, and then the hops are picked by hand as rapidly as possible, the bines being cut about three feet from the ground, to allow of the poles being pulled up and the plants brought within reach; they are then generally laid sloping over a frame, beneath which a cloth or sort of cradle is laid to catch the hops as they are picked. The necessity of completing this operation quickly and during fine weather compels the employment of many hands, and the "hopping time," in the counties where they grow, is as busy and cheerful a season as the vintage in more southern climes; a hop-yard, at the time of harvest, greatly resembling a vineyard during the grape season.

The hops are dried in a kiln, and afterwards slightly heated by being laid in heaps on a floor; they are then closely packed in canvas bags, or "pockets," for sale. The uncertainty of the crop, the great expense attending its culture, and the heavy excise duty levied on it, render the occupation of the hop-grower very speculative and precarious. He may lose in one year more than he can gain by several favourable seasons.

Kent and Sussex are the counties where hops are mostly grown, but large quantities are raised in Hampshire, Worcestershire, and Herefordshire; whilst the finest kinds come from a small district around Farnham in Surrey.

Hops serve three important purposes in brewing:—

- 1st. They impart an agreeable flavour to the beer.
- 2nd. They check acetous fermentation, and thus render the beer capable of being kept.
- 3rd. Their tannin helps to clarify the beer by precipitating the albumen of the barley.

Their active qualities reside chiefly in the golden yellow grains of *lupulite* with which they are covered. According to Payen, the lupulinic grains contain 2 per cent. of volatile oil, 10·30 of bitter principle, and 50 to 55 of resin; the scales also contain tannin. The volatile oil is acrid, its odour that of hops, and its colour yellowish: it is said to act on the system as a narcotic. *Lupuline*, or the bitter principle of hops, is neutral, uncrystallisable, yellowish white, very bitter, and destitute of the narcotic property of the oil.

In the manufacture of beer the tannic acid is of great service, as before explained. All genuine beer contains tannic acid. The resin is of a golden yellow colour, and is soluble in alcohol. It appears to be the oil changed into resin by oxidisation. Recently some fine beer has been manufactured by the use of lupuline extracted from hops without the actual addition of the hops themselves, but we doubt the ultimate success of the experiment, from the absence of the other constituents which we have mentioned beside the lupuline, in the hop. The odorous emanations of hops possess narcotic properties, hence the benefit of a pillow of hops for inducing sleep. It is a popular remedy in hop countries, and the benefit which is said to have been obtained from it by George III., for whom it was prescribed by Dr. Willis, in 1787, brought it into general use. Hops are given internally in the form of tincture and extract, to relieve restlessness consequent on exhaustion and fatigue, and to induce sleep in the wakefulness of mania and other maladies, to calm nervous irritation, and to relieve pain in gout and arthritic rheumatism. Dr. Farre tells us he finds the tincture and extract both very useful in gouty spasm of the stomach. The preparation still holds a place in the British Pharmacopœia. The yellow powder, lupuline, is administered sometimes in the form of powder or pills. They are aromatic and tonic. Tincture of hops has an advantage over opium, in not producing constipation, and in not disordering the stomach. Magendie, however, alleges that he never could observe any effect on animals, even from preparations of lupuline, and many medical men have denied any soporific power in the preparations of hops. Dr. Christison does not place much reliance on the efficacy of any of these substances, and says, "Various reasons favour the conjecture that whatever hypnotic virtue may be possessed by hops, it resides in the volatile oil; and if it be so, the ordinary officinal preparations must be inert, and the only good form is either lupuline prepared from hops not too ripe and not too long kept, or a tincture made from it before it is injured by age, such as the *Tinctura Lupuli* of the Edinburgh College."

The young shoots of the hop, when blanched, by covering them with earth, form an excellent substitute for asparagus, and are frequently eaten in the hop district, where it is often necessary to remove some of the suckers. The stems of the plant contain a large quantity of strong fibre, which may be used for cordage or textile fabrics; but, though rewards have been offered by the Society of Arts for bringing it into use, it has hitherto been little employed, jute and hemp being much cheaper and superior

for the purpose. Some fibre prepared from the hop plant was exhibited not long ago; but it is very doubtful whether it would ever pay to extract and prepare it so that it could be woven into cloth. A sort of canvas is made in Sweden from hop-fibre, obtained by macerating the stems in water for the whole winter. These stems are often twisted into rough cordage to tie up the bags in which the hops are packed.

A yellow tint is yielded by the juice, which may be used as a dye.

SUB-ORDER III.—ULMACEÆ.

Flowers perfect or polygamous, not arranged on a fleshy clinanth nor spadix. Filaments elongate, incurved in bud. Ovary 2-celled or imperfectly 2-celled, each cell containing a single suspended ovule, rarely 1-celled or 1-ovuled; styles or stigmas 2. Fruit 1-celled and 1-seeded, a dry samara or more rarely a drupe. Seed exalbuminous or with a small portion of gelatinous albumen; embryo straight or more rarely curved; radicle remote from the hilum

GENUS V.—**ULMUS**. *Linn.*

Flowers perfect, rarely polygamous. Perianth campanulate or funnelshaped, membranous, limb with 5 or more rarely 4 to 8 lobes. Stamens 5, rarely 4 or 8. Ovary ovoid, compressed, 2-celled, each cell with 1 ovule; styles 2, stigmatiferous on the inner face. Fruit (*samara*) 1-celled and 1-seeded, ovoid, much compressed, surrounded by a broad membranous reticulated wing.

Trees or shrubs with alternate rough serrate subdistichous leaves and flowers in small lateral fascicles opening before the leaves appear.

Dr. Mayne gives us the derivation of the name of this genus of plants thus—"As if from *Ulinus*, from *uliginosus*, moist or plashy, because it grows best in damp or moist situations."

Mr. Loudon, in his "Arboretum," says, "It is supposed to be derived from the Saxon word *elm* or *ulm*, a name which is applied with very slight alterations to this tree in all the dialects of the Celtic tongue. *Ulm* is still one of the German names for Elm, and the City of *Ulm* is said to derive its name from the great number of Elm trees that are growing near it. There are above forty places in England mentioned in the 'Doomsday Book,' which take their name from that of the Elm, such as *Barn Elms*, *Nine Elms*, &c."

SPECIES I.—**ULMUS SUBEROSA**. *Ehrh.*

PLATES MCCLXXXV. MCCLXXXVI.

U. campestris *Linn.* Sp. Pl. p. 327 (part), Planch. in *Phytol.* 1848, p. 35. *Benth.*

Handbk. Brit. Fl. ed. ii. p. 415. *Fries*, Sum. Veg. Scand. p. 53.

U. campestris, var. β , *suberosa*, *Koch*. Syn. Fl. Germ. et Helv. ed. ii. p. 734. *Gren.* & *Godr.* Fl. de Fr. Vol. III. p. 105. Non *Linn.*

Leaves acute or shortly acuminate, doubly serrate. Flowers shortly

stalked. Perianth funnelshaped; segments 4 or 5, ciliated. Fruit obovate or ablong, notched at the apex, with the seed placed beyond the middle and near the apex of the wing.

Var. α , *genuina*.

PLATE MCCLXXXV.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tabs. DCLX. Fig. 1330, DCLXI. Fig. 1331, DCLXIII. Fig. 1333.

Billot, Fl. Gall. et Germ. Exsicc. No. 3203.

U. campestris and *U. suberosa*, *Sm.* Engl. Bot. Nos. 1886 and 2161; and *Lind.* Syn. Brit. Fl. p. 226.

U. minor (*Mill.*), *U. campestris*, *Linn.* and *U. suberosa*, *Reich.* Ic. l. c. p. 1213.

Leaves scabrous above, minutely pubescent beneath.

Var. β , *glabra*.

PLATE MCCLXXXVI.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLXIV. Fig. 1334.

U. glabra, *Sm.* Engl. Bot. No. 2248.

U. carpinifolia, *U. glabra*, and *U. stricta*, vars. α and β , *Lind.* Syn. Brit. Fl. pp. 226, 227.

Leaves at length smooth and shining above, glabrous beneath, except in the axils of the veins.

Borders of woods and hedgerows. Doubtfully wild, but generally distributed in England. Frequent in the south of Scotland, where, however, it appears to have no claim to be considered native. Common, but doubtfully native in Ireland.

England, [Scotland, Ireland.] Trec. Early Spring.

A tree, attaining a great size, sometimes 80 feet or more, sending up numerous suckers, with rough brown cracked bark, the branches often with very thick corky excrescences upon them, the shoots of the year pubescent; buds rather small, purplish. Leaves shortly stalked, oval or obovate or elliptical, unequal at the base, $1\frac{1}{2}$ to 3 inches long. Flowers appearing before the leaves, very shortly stalked, in fascicles from buds formed in the axils of the leaves of the previous year's growth. Perianth $\frac{1}{10}$ inch across, dull purple. Stamens generally 4, reddish, much exerted; anthers dark purple. Samara $\frac{1}{2}$ to $\frac{5}{8}$ inch long, the greater part composed of a membranous wing, with transverse branched veins extending from the small seed-cavity, which lies mainly beyond the middle of the wing, the seed-cavity brown, the wings much paler and green until it is nearly ripe. In var. α the leaves are scabrous above and pubescent beneath, though more so in the axils of the veins.

Var. β appears to differ only in the leaves being much smoother and destitute of hairs except in the axils of the veins.

Common Elm.

French, *Orme commun*. German, *Feldulme*, *Rüster*.

The elm is the first tree that salutes the early green spring with its light and cheerful green, a tint which contrasts agreeably with the oak, whose early leaf has generally more of the olive cast. We see them sometimes in fine harmony together about the end of April or the beginning of May. Its appearance is familiar to everyone. It grows frequently to the height of sixty or seventy feet, and occasionally even higher, with a trunk measuring often from three to five feet in diameter at the lower part. The bark of the trunk is remarkably rugged, and furrowed longitudinally—peculiarities that in some varieties extend even to the small branches, which, however, in the typical form of the tree, are smooth. The flowers grow in the early spring, and are produced in small round branches, chiefly at the summit of the tree; the anthers are purplish. The blossoms open long before the leaf-buds begin to expand, and being generally produced in great abundance, give at that season an appearance of density to the otherwise slender and finely-divided ends of the branches. The flowers are succeeded by winged seed-vessels, which rarely ripen in this country. If allowed to grow naturally in a good deep soil, no tree is more beautiful than the elm when it has attained a large size; but most of our trees in the lanes and hedgerows are disfigured and distorted by lopping off the side branches, with a view either to lessen the shade they throw over the fields, or to straighten the trunk—an object often gained at the expense of the soundness of the timber, for such artificially-trained trees often prove hollow and rotten. According to Evelyn, a common elm will produce a load of timber in forty years: it does not, however, cease growing in favourable situations for 100 or 150 years, and will live for centuries. Gilpin remarks that “no tree is better adapted to receive grand masses of light. In this respect it is superior to the oak and ash; nor is its foliage shadowing, as it is of the heavy kind. The elm naturally grows erect, and when it meets with a soil it loves, rises higher than the generality of trees; and after it has assumed the dignity and hoary roughness of age, few of its forest brethren excel it in grandeur and beauty.”

The elm was known to the ancient Greeks, as appears evident from the fact that Pliny mentions that the Greeks had two distinct kinds, one inhabiting the mountains, and the other the plains. The Romans, Pliny tells us, had four kinds; the Mountain, or late Elm, the Gaulic Elm, and the Wild Elm. As an ornamental tree it was scarcely known in France until the time of Francis I., who appears first to have planted it in the public walks about 1540. It was afterwards planted largely, particularly in churchyards, by Sully, in the time of Henry IV.; and by desire of that king, who, according to Evelyn, expressed a wish to have all the highways in France planted with it, it soon became the tree most generally used for promenades and hedgerows. In England the elm has been planted from time immemorial, probably from the time that the island was in possession of the Romans, though some writers say it was introduced at the time of the Crusades. The oldest elm trees on record are, we believe, those of Mongewell in Oxfordshire, which were celebrated in the time of Leland, in the reign of Queen Elizabeth. Mr. Loudon thinks there may be older trees than this unnoticed. The timber of the elm is very valuable when sound, as it possesses qualities not to be found in other trees, especially that of durability under water; therefore, it is peculiarly adapted for shipbuilding, and all purposes where it

is exposed to the weather. Sir J. E. Smith says that in Norfolk elm wood is generally used for the naves of wheels, and in many parts of England, particularly London, it is also employed for coffins. The knobs which grow upon old trees are divided into thin plates by cabinetmakers, particularly in France and Germany, and when polished they exhibit very curious and beautiful arrangements of the fibre, which render this wood suitable for ornamental furniture. Elm wood has been used from time immemorial for water-pipes, troughs, &c., and for conveying water to the salt-pans or boxes where salt is evaporated. Our Saxon forefathers called all places where there were salt springs *wich* or *wych*, such as Droitwich, Nantwich, &c.; hence, probably, came the name of *Wych Elm*, which was originally applied to the common British Elm. The leaves and young shoots of the elm were used by the Romans to feed cattle, and they are still so employed in many parts of France. They have in some places been given to silkworms, and in France and Norway they are boiled to serve as food for pigs. In some places the bark is used as an astringent medicine, and the inner bark for making bast, masts, and ropes. Young deer are very fond of the bark, and in Norway they kiln-dry it, and grind it with corn to make flour for bread.

Some years ago an immense quantity of dried elm leaves were used for adulterating tea, and for manufacturing a substance intended to be used as a substitute for it. They are astringent, but contain a considerable quantity of mucilaginous matter. The bark of the elm contains a considerable quantity of tannin united with mucilage, rendering it medicinal as a tonic and demulcent and of use in tanning. A decoction of it has been used as a diuretic in dropsy, and it is said to be a good substitute for sarsaparilla. In England the elm is seen to perfection in many gentlemen's parks, and we recall the beautiful avenue of elms in St. James's Park, and at Oxford and Cambridge. The ancient poets often mention the elm tree, which, in common with other trees, or such as did not produce fruit fit for human food, were devoted to the infernal gods. They were given up entirely to funereal purposes. Homer alludes to this in the "*Iliad*," when he tells us that Achilles raised a monument to the father of Andromache in the midst of a grove of elms—

"Jove's sylvan daughters bade these elms bestow
A barren shade, and in his honour grow."

Ovid mentions that when Orpheus returned to earth after his descent into the infernal regions, his lamentations for the loss of Eurydice were so pathetic, that the earth opened, and the elm and other trees sprang up to give him shade and comfort. The Romans planted the elm as a support to the vine, and it is still used for this purpose in the south of Italy. This circumstance gives rise to many allusions to the tree by poets, both ancient and modern. Ovid makes Vertumnus allude to it when recommending matrimony to Pomona—

"If that fair Elm, he cried, alone should stand,
No grapes would glow with gold, and tempt the hand,
Or if that Vine without her Elm should grow,
'Twould creep a poor neglected shrub below."

Milton, in "*Paradise Lost*," describing the occupation of Adam and Eve, says:—

"She led the Vine
To wed her Elm; she spoused, about him twines
Her marriageable arms; and with her brings
Her dower, the adopted clusters, to adorn
His barren leaves."

In the early days of Christianity the hunters were accustomed to hang the skins of the wolves they had killed in the chase on the elms in the churchyards as a kind of trophy. The elm is generally propagated by the numerous suckers which arise from around the trunk, and which readily grow and form good trees when separated from the parent tree.

The elm is subject to many diseases, and is liable to be attacked by various insects. One, vulgarly called the elm-flea, devours the leaves, but is said not to injure the tree. Another is a sort of beetle, which destroys not only the leaves, but the bark of the tree, and a third is a species of cossus or goat moth, which is said to have destroyed innumerable trees, particularly in the neighbourhood of Paris. It discharges from its mouth an oily and acrid liquid, which is supposed to soften the wood before it devours it. The liquid has a strong scent, like a goat, whence the English name of the insect is derived.

We have numerous records of old and stately elms, of trees of prodigious size and beauty. Evelyn mentions elms standing in his time in good numbers, "that will bear almost 3 feet square for more than 40 feet in height. Mine own hands," he adds, "measured a table more than once of about 5 feet in breadth, 9½ feet in length, and 6 inches thick, all entire and clear. This, cut out of a tree felled by my father's order, was made a pastry-board." Queen Elizabeth is said to have planted an elm at Chelsea, which was cut down in 1745, and sold for a guinea by the Lord of the Manor, Sir Hans Sloane, on account of its inconvenience to the public road, near which it stood. A large hollow elm tree is said to have existed at Hampstead in 1663, which was upwards of 42 feet high. It was hollow from the ground to the summit, and had stairs inside, which led to a turret at the top, containing seats on which six persons might sit. There are accounts existing of many other celebrated elms. The row of trees in St. James's Park next the Palace are many of them 160 years old. Many of them have been blown down since. Mr. Loudon writes:—"Mr. Jesse mentions an elm tree in Hampton Court Park called King Charles's swing, which, he says, is curious from its size and shape. At 8 feet from the ground it measures 35 feet in circumference."

One of the elms standing at the entrance of the passage leading to Spring Gardens was planted by the Duke of Gloucester, brother to Charles I. Mr. Loudon, whose information on forest trees is most complete and exhaustive, gives us particulars and details of many other very remarkable trees still existing, or very recently destroyed.

SPECIES II.—*ULMUS MONTANA*. Sm. Auct.

PLATE MCCLXXXVII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1764.

U. campestris, *Linm.* Herb. (!) *Sp. Pl.* p. 327 (part).

U. montana and *U. stricta*, *Lind.* Syn. Brit. Fl. p. 227.

U. campestris, var. *a*, *nuda*, *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 734 (part).

Leaves acuminate, doubly serrate. Flowers shortly stalked. Perianth funnelshaped; segments 4 to 6, ciliated. Fruit oval or elliptical, notched at the apex, with the seed placed about the middle, and remote from the apex of the wing.

Var. *α*, *genuina*.

PLATE MCCLXXXVII

*Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLXII. Fig. 1332.**U. montana, Sm. Engl. Bot. No. 1887.*

Branches without corky excrescences. Leaves rough.

Var. *β*, *major*.*Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCLXV. Fig. 1335.**U. major, Sm. Engl. Bot. No. 2542.**U. suberosa, β major, Hook. & Arn. Brit. Fl. ed. viii. p. 393.*Branches with corky excrescences. Leaves rough, generally larger than in var. *α*.Var. *γ*, *nitida*.*U. glabra, γ, latifolia, Lind. Syn. Brit. Fl. p. 227. Bab. Man. Brit. Bot. ed. ii. p. 285.*

Branches without corky excrescences. Leaves shining and glabrous above.

In woods and hedgerows. Generally distributed, but often planted. Certainly wild in the north of England, in Scotland, and the north of Ireland.

England, Scotland, Ireland. Tree. Early Spring.

U. montana resembles *U. suberosa*, but has fewer suckers or twigs produced from the trunk; the branches are longer and more spreading; the leaves 3 to 6 inches long, generally much larger; broader in proportion, and more acuminate or even cuspidate; the young branches generally more downy; the samara is variable in shape, but larger than in *U. suberosa*; but the chief difference is in the position of the seed-cavity, which is about the middle of the general outline of the wing; the notch in both species is variable in depth, and in each extends sometimes nearly down to the seed-cavity.

U. major, of Smith, the so-called Dutch elm, certainly belongs to *U. montana*, though in the figure in "English Botany" the seed in the largest samara is placed near the apex of the wing, doubtless through the inaccuracy of the draughtsman, who has correctly delineated the other samaræ in the fascicle.

The var. *γ*, *nitida*, is often confounded with var. *glabra* of *U. suberosa*, but it has all the essential characters of the normal *U. montana*.

*Broad-leaved Elm.*French, *Orme de montagne*. German, *Feld-Ulme*.

This species of elm is sometimes called the Scotch or wych elm. It is of quicker growth than the former species, and the wood is consequently far inferior in hardness

is now applied. Modern artificers, however, find that, when the latter can be obtained, it is better and more durable. The name of the tree appears to have been derived from the former use of elm wood for making the troughs and pipes by which the brine was conveyed from the salt springs or *wyches*: it was, in ancient times, often given to the common elm as well as to this species. Either from some strange association of ideas resulting from the name, or from some forgotten superstition, the wych elm had the credit of being a powerful charm against witchcraft and evil spirits. In some parts of the midland counties it is still the practice to put a small piece of wood in every churn to ensure the safety of the milk from fairies and witches, who might otherwise prevent its conversion into butter; and in many places the peasantry place the same confidence in its protecting powers as the Highlanders did in those of the rowan tree. Mr. Johnson suggests that the superstition is of Scandinavian origin, for the tree seems to have had some sacred character assigned it by the old Norsemen, the floating log that was converted by the sons of Bore into the first woman having been according to the "Edda" of elm. It is very rarely that this species of elm produces suckers, but it roots readily from layers. The best mode of propagating it, however, is from seeds, which ought to be gathered by the hand before they drop, and directly they are ripe.

ORDER LXXII.—**A M E N T I F E R Æ.**

Trees or shrubs, mostly with alternate leaves, and foliaceous and persistent or scarious and deciduous stipules. Flowers, or at least the male ones, in catkins, always unisexual, diœcious or monœcious. Perianth in the male flowers of 1 or more small floral-scales, though perhaps in all cases this supposed perianth is formed of bracts: stamens definite, often 2 within each catkin scale. Female catkins like the male, or reduced to 1 or few terminal flowers, with the lower catkin scales empty, and forming an involucre round it: perianth adnate to the ovary or of 1 or 2 small scales or free and cuplike: ovary 1 or more celled, with the styles 2 or more. Fruit 1-celled and 2-valved, with several seeds, or 1-celled, 1-seeded, and indehiscent; in the latter case sometimes surrounded with an involucre of bracts.

SUB-ORDER.—**CUPULIFERÆ.**

Leaves alternate, simple, pinnately veined. Stipules deciduous. Flowers monœcious. Male flowers in cylindrical or oblong catkins,

each catkin-scale sometimes with 2 floral scales adnate to it, or with the floral-scales cohering, and forming a perianth (?) with 4 to 6 lobes: stamens 6 to 20. Female flowers solitary or 2 or 3 together, surrounded by an involucre, which increases in size after flowering: perianth adhering to the ovary, and apparent only as a very minute and often deciduous crown of teeth: ovary 2- to 7-celled, with 1 or 2 pendulous ovules in each cell. Fruit a nut, which is 1-celled and 1-seeded by the abortion of the other cells and ovules, enclosed in a cupule formed by the enlarged involucre of the female flowers.

GENUS I.—**QUERCUS.** *Tournef.*

Male flowers in long slender interrupted flexible catkins, without catkin-scales, or with minute and deciduous ones at the base of the glomerules of which the catkin is composed: floral-scales combined into a cuplike perianth (?) with 6 or 8 narrow unequal segments: stamens 6 to 10, inserted in a glandular disk at the base of the perianth. Female flowers solitary, surrounded by a cup-shaped involucre, the outside of which is furnished with numerous scale-like or linear or subulate bracts imbricated in many rows: perianth completely adherent to the ovary, and produced but little beyond it, the limb with 6 teeth or nearly entire: ovary with 3 or 4 cells; ovules 2 in each cell; style short and thick; stigmas as many as the cells of the ovary, usually spreading. Nut ovoid or oblong-ovoid, crowned by the minute calyx-limb and style, 1-celled and 1-seeded, solitary, the base inserted in a woody cupule with an entire margin, and with the outside marked by bosses or clothed with the linear points of the bracts of which it is composed; pericarp tough and leathery. Cotyledons filling the seed, plano-convex, fleshy-farinaceous.

Trees with scaly buds, and deciduous or evergreen leaves often sinuated at the margins. Flowers monœcious, appearing before the leaves or with the young leaves.

The derivation of the name of this genus of plants is differently given. One writer says it is derived from two Celtic words, *quer frise*, and *cuez*, a tree; others say it comes from the Greek word *χοῖρος*, a pig, because pigs feed on the acorns. Mr. Loudon tells us that the Celtic name for the oak is *Derw*, and is said to be the root of the word *Druid*—that is, priest of the oak—and of the Greek word *Drus*. The Hebrew name for the oak (*Al* or *Alow*) is said to be the origin of the old English word *clan*, originally signifying an oak grove or place of worship of the Druids, and afterwards, by implication, a town or parish; and also of the Irish words *clan* and *clun*. In the book of Isaiah (chap. 44, verse 14), idols are said to be made of Allun or Alow—that is, of oak.

SPECIES I.—**QUERCUS ROBUR.** *Linn.*

PLATES MCCLXXXVIII. MCCLXXXIX.

Leaves deciduous, oblong-oblongate or oblong-elliptical, sinuated, with blunt lobes extending not more than half-way down to the midrib. Fruit solitary or aggregated on axillary stalks. Cupule $\frac{1}{4}$ to $\frac{1}{2}$ the length of the ripe fruit, with closely imbricated deltoid or triangular-ovate adpressed scales destitute of subulate points. Leaves glabrous when old, somewhat shining, pubescent beneath when young.

SUB-SPECIES I.—**Quercus pedunculata.** *Willd.*

PLATE MCCLXXXVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXLVIII. Fig. 1313.

Billot, Fl. Gall. et Germ. Exsicc. No. 2532.

Q. robur, Sm. Engl. Bot. ed. i. No. 1342. Teight. Fl. Shrop. p. 473. Crep. Man. Fl. de Belg. ed. ii. p. 267.

Leaves very shortly stalked, irregularly sinuate-pinnatifid; lobes commonly divided half-way down to the midrib, and extending to the apex, the sinus between them forming an acute angle, though generally rounded off at the bottom. Fruit peduncle longer than the acorn, and much longer than the petiole.

In woods, copses, hedgerows, &c. Common, and generally distributed, though doubtless planted in many of its stations.

England, Scotland, Ireland. Tree. Spring.

A tree attaining a great size, with widely spreading branches and grey fissured bark. Leaves 3 to 6 inches long, with very short petioles; lamina commonly unequal and more or less notched at the base, but sometimes decurrent upon the petiole, firm, somewhat leathery, shining and glabrous above when full-grown, paler beneath, where it is often downy when young, with 4 to 6 large obtuse lobes on each side, pointing towards the apex of the leaf. Flowers appearing with the young leaves, on shoots produced from buds formed on the wood of the previous year, and surrounded by brown scarious bracts; male catkins long, pendulous, 2 or 3 together, 1 to 3 inches long, with numerous flowers in fascicles, which are distant, especially towards the base of the catkin. Fruit peduncle 1 to 4 inches long, with a fruit at the apex, and generally 1 or 2 others between that and the base; these are sometimes remote, sometimes approximate. Cupule hemispherical, sessile upon the peduncle, rather smooth. Acorn $\frac{1}{2}$ to $1\frac{1}{4}$ inch long, yellowish-green until it is fully ripe, when it becomes brownish-olive.

Common Oak.

French, *Chêne à fruits pédonculés*. German, *Stiel Eiche*.

The oak is perhaps the most important of our British forest trees, and is almost characteristic of our island. "British oak" is supposed to represent our navy, and "hearts of oak" are considered typical of our brave sailors. A complete account of the uses and applications of the English oak would fill volumes. In comparison with other trees, the wood of the oak is more valuable, and more applicable to a variety of purposes, than any grown in the British islands. Whether for house or ship-building, posts, piles, mill-work or other machinery, for any work liable to exposure, to weather, or to damp, no wood equals that of the oak. We have oaken beams and doors in our most ancient buildings known to be seven or eight hundred years old, and are as strong and sound now as ever. The stakes driven by the Britons into the bed of the Thames to prevent the passage of Caesar's army, were found, after the lapse of two thousand years, still strong and hard within. The quantity of oak timber annually consumed in this country for ship-building is enormous, although it is now in some measure superseded by iron. McCulloch calculated that the amount of oak wood yearly required for the support of the English navy during the French war, according to a report made to the Government in 1806, was a hundred and ten thousand loads, and that at least a hundred thousand acres of land would be required for its growth. Other nations may possess finer, more showy, and more fragrant trees, but the oak has its own intrinsic value, as well as its beauty, to entitle it to be considered the monarch of trees. Bernard Barton wrote a poem in praise of the oak, and Pope has expressed the national pride in these pithy lines:—

"Let India boast her plants, nor envy we
The weeping amber and the balmy tree,
While by our oaks the precious loads are borne,
And realms commanded which those trees adorn."

Few writers have described the oak so well as Virgil in his "Georgics." He calls it "Jove's own tree," as it was made sacred to Jupiter by the Romans:—

"Jove's own tree, •
That holds the woods in awful sovereignty,
Requires a depth of lodging in the ground,
And next the lower skies a bed profound.
High as his topmost boughs to heaven ascend,
So low his roots to hell's dominions tend:
Therefore nor winds nor winter's rage o'erthrow
His bulky body, but unmoved he grows.
For length of ages lasts his happy reign,
And lives of mortal men contend in vain.
Full in the midst of his own strength he stands,
Stretching his brawny arms and leafy hands:
His shade protects the plains, his head the hills commands."

In early ages probably by far the greater proportion of this island was covered with forests of oak, and the number of names of places in which the word occurs as a prefix indicates its former abundance. It is never found in perfection excepting in good soil and in a temperate climate. After oaks have stood for five or

six years they grow rapidly till they have attained the age of thirty or forty years, after which most of the species live and continue to increase in size for centuries. The earliest histories that exist contain records of the oak. The grove planted by Abraham at Beersheba was of *allun*, which Hillier considers to have been *Quercus Esculus*; and in Eusebius's "Life of Constantine" we find the oaks of Mamre expressly mentioned as a place where idolatry was committed by the Israelites close to the tomb of Abraham. These, Dr. Hooker tells us, were fine specimens of *Q. Pseudo-coccifera*. The first mention of the oak in the English version of the Bible appears to be in Genesis xxxv. 8: "But Deborah, Rebekah's nurse, died, and she was buried beneath Bethel, under an oak: and the name of it was called Allonbachuth;" or, as we have it in the margin, "the oak of weeping." Numerous other instances of the mention of oaks occur in the Scriptures. We read of Absalom, whose hair was caught by the "thick boughs of a great oak," and of Joshua, before his death, taking a great stone, and setting it up there "under a great oak that was by the sanctuary of the Lord," as a witness against the people, lest they should deny God. Mr. Loudon writes: "Among the Greeks, the Arcadians believed that the oak was the first created of trees, and that they were the first people;" but, according to others, the oaks which produced the acorns first eaten by men grew on the banks of Achelous. Pelasgus taught the Greeks to eat acorns, as well as to build huts. The oak groves of Dodona in Epirus formed the most celebrated and most ancient oracle on record; and Pliny states that the oaks in the Forest of Hercynia were believed to be coeval with the world. Herodotus and numerous other Greek writers speak of celebrated oaks; and it was an oak that destroyed Milo of Crete. Pliny states that oaks still existed at the tomb of Ilus, near Troy, which had been sown when that city was first called Ilium." Socrates often swore by the oak; and on Mount Lycæus, in Arcadia, there was a temple of Jupiter, with a fountain, into which the priest threw an oak branch in times of drought, to produce rain. The Greeks had two remarkable sayings relative to this tree, one of which was, "I speak to the oak," as a solemn asseveration; and the other, "Born of an oak," applied to a foundling; because anciently children whose parents wished to get rid of them, were frequently exposed in the hollow of an oak-tree. Frequent reference is made to the oak by old writers, on account of the use made of the acorns in feeding pigs. The Romans used acorns for this purpose. In Strabo's time Rome was chiefly supplied with hogs which were fattened on the acorns in the woods of Gaul. Many laws were anciently enacted with reference to acorns. The Romans expressly provided, that the owner of a tree might gather up his acorns, though they should have fallen on another man's ground. In Britain at one time the oak was prized chiefly on account of the acorns. Woods of old were valued according to the number of hogs they could fatten, and so rigidly were the forest lands surveyed, that in ancient records, such as the Domesday Book, woods are mentioned of a "single hog." The right of feeding swine in the woods, called *Pannage*, formed, some few centuries ago, one of the most valuable kinds of property. With this right monasteries were endowed, and it often constituted the dowry of the daughters of the Saxon Kings. Evelyn states that a peck of acorns a day, with a small quantity of bran, will make a hog increase a pound in weight per day for two months together. Acorns, in times of scarcity, and in some countries, have supplied valuable food for man as well as for beasts. Pliny tells us, in his time, that they were ground, mixed with meal, and made into bread. He also says, that in Spain acorns were brought to table to eat. Spenser alludes to this in these lines—

“The oak, whose acorns were our food before
That Cere’s seed of mortal man was known,
Which first Triptolemene taught to be sown.”

During the war in the Peninsula, both the natives and the French fed on the acorns found in the woods.

The antiquity of oak forests is attested by the numerous trees which have been dug out of bogs, or raised up from beds of rivers, after having lain there apparently for centuries. Fossil oaks, which are abundant in the Isle of Portland, in the limestone known as Portland stone, afford proof of the great antiquity of this tree. An enormous oak was discovered in Hatfield Bog, in Yorkshire, the timber of which was perfectly sound; though, from some of the coins of the Emperor Vespasian being found in the bog close by, it is supposed to have lain there above a thousand years. The carvings and ornaments made in Ireland from wood obtained from the bogs of that country are chiefly of oak. The wood thus used is very hard and black.

The ancient legends and superstitions regarding the oak are very remarkable. The oaks in the sacred forest of Dodona are mentioned by Herodotus, who relates the traditions he heard respecting them from the priests of Egypt. All the trees in the grove, he says, were endowed with the gift of prophecy; and the sacred oaks not only spoke and delivered oracles while in a living state, but when some of them were cut down to build the ship *Argo*, the beams and masts of that ship often spoke, and warned the Argonauts of their danger. The oracle of Dodona was not only the most celebrated, but the richest in Greece, from the offerings of those who came to enquire into futurity. The prophecies were first delivered by doves, which were always kept in the temple, but afterwards the answers were given by the priestesses; or, according to Homer and others, by the oaks themselves—hollow trees no doubt being chosen, in which a priest might be concealed. The oracular power of the Dodonian oaks is often alluded to, not only by the Greek and Latin poets, but by those of modern times. Cowper says, addressing the Yardley Oak,—

“Oh! could’st thou speak,
As in Dodona once thy kindred trees,
Oracular, I would not curious ask
The future, best unknown; but at thy mouth
Inquisitive, the less ambiguous past.
By thee I might correct, erroneous oft,
The clock of history; facts and events
Timing more punctual, unrecorded facts
Recovering; and misstated, setting right.”

The oak was considered by the ancients as the emblem of hospitality; because, when Jupiter and Mercury were travelling in disguise, and arrived at the cottage of Philemon, who was afterwards changed into an oak tree, they were treated with the greatest kindness. Philemon was a poor old man, living with his wife Baucis in Phrygia, in a miserable cottage, which Jupiter, to reward his hospitality, changed into a magnificent temple, of which he made the old couple priest and priestess, granting them the only request they made to him, viz. that they might die together. Accordingly, when both had grown so old as to wish for death, Jupiter turned Baucis into a lime-tree, and Philemon into an oak; the two trees entwining their branches, and shading for more than a century the magnificent portal of the Phrygian temple. The civic crown of the Romans was made of oak-leaves, and was given for eminent

services rendered to the State, the greatest of which was to save the life of a Roman citizen. Shakespeare, in describing the merits of Coriolanus, mentions this crown :—

“ At sixteen years,
When Tarquin made a head from Rome, he fought
Beyond the mark of others : one then dictator,
Whom with all praise I point at, saw him fight,
When with his Amazonian chin he drove
The bristled lips before him ; he bestrid
An o’erpressed Roman, and i’ the Consul’s view
Slew three opposers ; Tarquin’s self he met,
And struck him on his knee : in that day’s feats,
When he might act the woman in the scene,
He proved best man i’ the field, and for his meed
Was brow-bound with the oak.”

Boughs of oak with acorns were carried in marriage ceremonies, as emblems of fecundity. Sophocles describes Iccate as crowned with oak-leaves and serpents. Pliny relates of the oaks on the shores of the Cæchian Sea, that, undermined by waves, and propelled by the winds, they bore off with them vast masses of earth in their interwoven roots, and occasioned the greatest terror to the Romans, whose fleets encountered these floating islands. The beautiful fiction of the Hamadryads is frequently referred to by the Greek poets. The Hamadryads were nymphs, each of whom was

“ Doom’d to a life coeval with her oak.”

Loudon quotes some lines from the Hymn to Delos, representing Melie as

“ Sighing deeply for her parent oak,”

And adds,

“ Joy fills her breast when showers refresh the spray ;
Sadly she grieves when autumn’s leaves decay.”

In Appollonius Rhodius we find one of the Hamadryads imploring a woodman to spare the oak to which her existence was attached :—

“ Loud through the air resounds the woodman’s stroke,
When, lo ! a voice breaks from the groaning oak.
‘ Spare, spare my life ! a trembling virgin spare !
Oh, listen to the Hamadryad’s prayer !
No longer let that fearful axe resound ;
Preserve the tree to which my life is bound !
See, from the bark my blood in torrents flows :
I faint, I sink, I perish from your blows.’ ”

The superstitions connected with the British oak are closely associated with the history of the Druids in England. During the early times of these islands, the forests of England were not only useful as a means of subsistence, and a secure retreat from enemies, but they were also devoted to the most sacred rites of religion. Groves of oaks were more especially preferred by the Druids—these early priests of a dark religion ; and oak branches were always used in their religious ceremonies. The discovery of the mistletoe on the oak was a circumstance of very rare occurrence, and was therefore looked upon as indicative of the peculiar favour of Heaven, and as

a certain sign that the tree on which it grew was chosen by the Deity for religious reverence. So rarely was the mistletoe to be seen on the oak, that when found it was resorted to with the greatest devotion. In the ceremony of cutting it, the Druids used to observe that the moon was just six days old. The festival entertainment being made ready under the oak, two white bulls were brought thither and tied to the tree by their horns. This done, the officiating priest, habited in a white vestment, climbed the tree, and with a golden pruning-knife carefully separated the mistletoe from the oak on which it grew. It was received in a white woollen cloth by the attendant priests below, who then proceeded to kill the beasts for sacrifice, and make their prayers to their god, that he would bless this his own gift to those to whom they should dispense it. They believed that a decoction of mistletoe was a sovereign remedy for sterility, and a cure for all manner of poisons. At the present time there has been much discussion as to the growth of the mistletoe on the oak, and it is a popular fallacy to believe that it is at all common in such a situation. On the apple-crab and other trees it is constantly seen, but Mr. Jesse, surveyor of Her Majesty's Parks, who made many enquiries on the subject, says that he never could hear of any instance of the mistletoe being found on the oak trees in any of the Royal Parks. Timber merchants have also assured him that they never had seen it on the oak. Some years ago the Society of Arts offered a reward for the discovery of it, and a single instance was found somewhere in Gloucestershire. Subsequently other specimens have been discovered. Dr. Prior suggests that the *Quercus pubescens*, on which the Loranthus, another form of parasitic plant, now grows in the south of Europe, may have once existed in Great Britain, and have afforded the Druids a means of gathering the fabled mistletoe.

The ancient Yule-log was always made of oak; and, according to Professor Burnett, was named after Hu, the Bacchus of the Druids; others derive it from Baal, Bel, or Yiaoul, the Celtic god of fire, whose festival was kept at Christmas, the time of the Saturnalia. The Druids professed to maintain perpetual fire; and once every year all the fires belonging to the people were extinguished, to be relighted from the sacred fire of the Druids. This was the origin of the Yule-log, which, even so lately as the beginning of the last century, was used to kindle the Christmas fire.

The Saxons held their national meetings under the oak; and the celebrated conference between the Saxons and the Britons, after the invasion of the former, was held under the oaks of Dartmoor. The wood of the oak was appropriated to the most memorable uses. King Arthur's round table was made of oak, as was the cradle of Edward III., when he was born at Caernarvon Castle: this sacred wood being chosen in order to conciliate the feelings of the Welsh, who still retained the prejudices of their ancestors, the Ancient Britons. It was considered unlucky to cut down any celebrated tree, and Evelyn gravely relates a story of two men who cut down the Vicar's Oak, in Surrey; one losing his eye, and the other breaking his leg, soon after.

Among the noble specimens of the oak which adorn our woodland scenery, some of them have singular histories attached to them. There is the historical tree known as the Abbot's Oak, at Woburn Abbey, on the branches of which, according to Stowe and other historians, the abbot and prior of Woburn, the vicar of Puddington, and "other contumacious persons," were hanged by order of Henry VIII.

Queen Elizabeth's Oak, in Hatfield Park, under which she is said to have been sitting when the news of her sister's death was brought to her, is still standing. The "Sidney Oak," at Penshurst Park, is a handsome tree, and would be noticeable apart from its associations. It is said to have been planted to commemorate the birth of Sir Philip Sidney, "whose spirit was too high for the Court, and his integrity too

stubborn for the Cabinet." In his description of Penshurst, Ben Jonson refers to this tree thus—

"That taller tree, which of a nut was set
At his great birth, when all the Muses met."

Waller tried to impress his love for Saccharissa on it:—

"Go, boy, and carve this passion on the bark
Of yonder tree, which stands the sacred mark
Of noble Sidney's birth."

"Turpin's Oak" is a celebrated tree, and we believe still stands on a plot of ground on the road to Barnet, opposite the "Green Man." The notorious Dick Turpin was, it is said, accustomed to take his station behind this tree when he was on a freebooting expedition to this part of the country. Its closeness to the great high road to the north made it a convenient ambush not only for Dick, but for highwaymen generally, who, about a century and a quarter ago, were continually robbing the mails, as well as travellers.

In Windsor Forest there are several celebrated oaks; one of these, the King Oak, is said to have been a favourite tree of William the Conqueror, who made this a royal forest. In Mr. London's time an oak was standing supposed to be the largest and oldest in the forest. It was quite hollow, and the space within about eight feet in diameter. It was said to be above 1,000 years old. Pope's Oak in Binfield Wood, Windsor Forest, has the words "Here Pope sang" inscribed on it. "Herne's Oak," in Windsor Park, has been immortalised by Shakespeare. There has been much controversy as to the identity of the tree now regarded as the celebrated one. It was stated to have been felled by order of George III., about fifty years ago; but Mr. London, thinking this very improbable, took great pains to ascertain the truth, and was convinced that in his time it was still standing. Tradition, which has been transmitted for many generations amongst the inhabitants of Windsor, fixes on one tree, now dead, on the piece of ground close to Frogmore Lodge as the veritable oak of Herne the Hunter. Its association with the "Merry Wives of Windsor," and as the scene of their merry pranks, gives it an interest, even though it be now withered and leafless. Mr. London writes: "Among the many appropriate passages it brought to my recollection, was the following—

'There want not many that do fear
In deep of night to walk by this Herne's Oak.'

The footpath which leads across the park is stated to have passed, in former times, close to Herne's Oak. The path is now at a little distance from it, and was probably altered in order to protect the tree from injury. I was glad to find a 'pit hard by,' where 'Nan and her troop of fairies and the Welch devil Evans' might all have couch'd without being perceived by the 'fat Windsor stag,' when he spake like 'Herne the Hunter.'" The pit above alluded to has recently had a few thorns planted in it, and the circumstance of its being near the oak, with the diversion of the footpath, seems to prove the identity of the tree, in addition to the traditions respecting it:—

"There is an old tale goes that Herne the Hunter,
Sometime a keeper here in Windsor Forest,
Doth all the winter time, at still midnight,
Walk round about an oak, with great ragged horns,
And there he blasts the tree."

The last acorn found on Herne's Oak was given to the late Sir David Dundas, of Richmond, and was planted by him on his estate in Wales, where it grew, and now flourishes, and has a suitable inscription on it.

In almost every county in England we have remarkable and historical oaks; the chronicles of most of which are given carefully in Loudon's "Arboretum." Some are worthy of record on account of their size, others from association. There is the Fairlop Oak, in Essex, which stood in an open space of Hainault Forest. The circumference of its trunk near the ground was forty-eight feet; at three feet high it measured thirty-six feet round; and the short bole divided into eleven vast branches. These boughs overspread an area 300 feet in circuit, and for many years a fair was held beneath their shade, no booth of which was allowed to extend beyond it. This celebrated festival owed its origin to the eccentricity of Daniel Day, commonly called "Good Day," who, about 1720, was wont to invite his friends to dine with him, the first Friday in July, on beans and bacon, under this venerable tree. From this circumstance becoming known, the public were attracted to the spot, and about 1725 the fair was established, and was held for many years on the 2nd of July in each year. Mr. Day never failed to provide annually several sacks of beans, which he distributed, with a proportionate quantity of bacon, from the hollowed trunk of the oak, to the assembled crowd. This entertainment, however, was the cause of serious mischief to the tree, and endeavours were made to preserve it. In 1793 a board was affixed to it, with this inscription: "All good foresters are requested not to hurt this old tree, a plaster having been lately applied to his wounds." Mr. Day had his coffin made of one of the limbs of this tree, which was torn off in a storm, and dying in 1767 at the age of eighty-four, he was buried in Barking churchyard. The most fatal injury this renowned tree received was from a party of cricketers, in June 1805, who carelessly left a fire burning too near its trunk. The tree took fire, and in spite of all efforts to extinguish it, was severely burnt. The high winds of February 1820 stretched this forest patriarch on the ground, after having endured the storms of perhaps 1000 winters. Its remains were purchased by a builder, and from a portion thereof the pulpit and reading desk in the new church of St. Pancras were constructed.

In the New Forest, Hampshire, stood the oak near which William Rufus was slain. The tree has now perished, and a stone perpetuates its memory, with this inscription: "Here stood the oak tree on which an arrow shot by Sir Walter Tyrell at a stag glanced and struck King William II., surnamed Rufus, on the breast, of which stroke he instantly died, on the 2nd of August, 1100." This stone was erected in 1745; and it is said that in the reign of Charles II. the oak was paled round by that monarch's command in order to its preservation. This tree appears to have blossomed at Christmas, as did also another called the Cadenham Oak, in the New Forest. Camden writes: "Having often heard of this oak, I took a ride to see it on the 29th of December, 1781. Having had the account of its early budding confirmed on the spot, I engaged one Michael Lawrence, who kept the 'White Hart,' a small alehouse in the neighbourhood, to send me some of the leaves to Kear's Hill, as soon as they should appear. The man, who had not the least doubt about the matter, kept his word, and sent me several twigs on the 5th of January, 1782, a few hours after they were gathered. The leaves were fairly expanded, and about an inch in length. From some of the buds two leaves had unsheathed themselves, but in general only one." One of the young trees raised from this oak possessed the same property. "The early spring of the Cadenham," Gilpin continues, "is of very short duration. The buds, after unfolding themselves, make no further progress, but immediately shrink from the season and die. The tree con-

tinues torpid, like other deciduous trees, during the remainder of the winter, and vegetates in the spring at the usual season."

A gigantic oak stands on the estate of the Earl of Albermarle, at Winfarthing, near Diss, in Norfolk, known as the "Winfarthing Oak." In 1820 this tree measured seventy feet in circumference at the extremity of the roots; in the middle, forty feet. The trunk is quite hollow, and the inside presents a most curious appearance, resembling old rugged masonry. It is fitted up with seats, a table, &c. An arm was blown off in 1811, which contained two waggon-loads of wood. It is said to have been known as the "Old Oak," in the time of William the Conqueror, but of this we have no certainty. Our own poet Cowper has immortalised an oak tree at Castle Ashby in Northamptonshire, and a poetical fragment, called "Yardley Oak," is amongst his collected works, which refers to this, one of his favourite trees—

"Time made thee what thou wert—King of the woods,
And time hath made thee what thou art—a cave
For owls to roost in! Once thy spreading boughs
O'erhung the champaign, and the numerous flock
That grazed it stood beneath that ample copse
Uncrowded, yet safe sheltered from the storm.
No flock frequents thee now; thou hast outlived
Thy popularity, and art become
(Unless verso rescue thee awhile) a thing
Forgotten, as the foliage of thy youth!"

The Royal Oak of Boscobel, in which Charles II. took refuge after the Battle of Worcester, was destroyed by a stupid passion for relics, and a huge bulk of timber, consisting of many loads, was taken away in handfuls.

In Scotland there are many remarkable oaks. The "Wallace Oak," in Ellerslie, the native village of the hero Wallace, was still standing when Loudon wrote in 1844. It is said that he and 300 of his followers hid themselves in its branches from the English.

Germany and France can both boast of their ancient and large oak trees, and records of many of them are kept by distinguished foresters. The statistics collected by Mr. Loudon as to the size, age, and value of oak-trees, both in the British islands and on the Continent, are very interesting. The terms used popularly to designate different kinds of oaks are given and explained.

Bull oaks are very old hollow trees, so called from bulls taking shelter in them.

Boundary oaks form divisions between counties and property of various kinds. There are many "Gospel Oaks" in England, so called from the custom of open-air preaching under their shade.

The bark of this and the following species of oak-tree, is alike valuable, and is used indiscriminately for tanning. The bark which contains the greatest quantity of tannin is obtained from those parts of the branches or trunks which are from twenty to thirty years' growth. Every part of the tree abounds in astringent matter, and even the leaves and sawdust will tan leather, linen cloth, netting, or cordage, which is to be much exposed to weather. The bark is prepared for tanning by being simply ground to a coarse powder between two cast-iron cylinders. Bark cut in the spring contains a much larger proportion of tannin than that cut in the autumn, and that cut in the autumn more than that cut in the winter. The quantity of tannin in oak-bark is considered by all tanners to be in proportion to the freedom with which the sap was flowing at the time of stripping, and to the facility with which

the bark is removed; hence that bark which presents the appearance of not having been easily detached, fetches a far lower price than that which seems to have been removed with facility. The richest bark is always obtained in the warmest spring, as it then contains most sap: a few days only of cold weather previous to felling and stripping causes a very perceptible reduction in the proportion of tannin and sap. The bark of coppice trees about twelve years old contains more tannin than that of younger trees, and the latter more than that of old trees. According to Dr. Stenhouse, the tannin of oak-bark does not afford pyrogallic acid when subjected to the destructive distillation, like the tannin of gall-nuts; from which circumstance it may be concluded that the tannin of the bark is not identical with that of galls. An analysis of oak-bark by M. Geiger, afforded 5 to 6 per cent. of tannin. Sir H. Davy estimated the entire bark of middle-sized oak cut in the spring to contain 6 per cent. In this, and all other astringent barks, the tannin is contained solely in the inner white layers next to the alburnum; the middle, coloured portion contains most of the extractive matter; and the epidermis, or exterior, contains little extractive matter and no tannin. According to common estimation, from three and a half to four pounds of oak-bark are required for the production of one pound of leather. The quality of leather made by means of oak-bark is considered to be superior to that of the leather made with either of the numerous tanning materials which are now so extensively employed in the place of bark. The process of tanning with bark, however, requires the longest time. The present price of English oak-bark is from 5*l.* to 8*l.* a ton. The price of foreign oak-bark, duty paid, per ton, is as follows:—

Dutch, from 5*l.* 10*s.* to 6*l.* 10*s.*; Flemish, from 5*l.* 10*s.* to 7*l.* 10*s.*; and German, from 4*l.* to 5*l.*

Oak-bark, on account of its tannin, has been used as an astringent medicine since the days of the Greek physicians. It is a very powerful astringent, and its decoction is an excellent gargle for relaxed sore throats; as well as a good lotion for ulcers, &c. It is not so much used in medicine now as formerly, quinine and astringents of foreign origin having in a great measure taken its place. The acorn-cups of a species of oak, the *Quercus Ægilops*, which grows in the Levant, are most valuable articles of export from the Morea, and from Smyrna and are known by the name of *Valonia*; above 7,500 tons of these cups being imported into this country from thence every year. They are sold almost wholly to tanners and dyers. It is said that the leather produced by means of valonia is harder and less permeable to water than that made with oak-bark, and so heavy as to constitute this the cheapest of all tanning materials, catechu or *terra japonica* only excepted. The leather produced by a mixture of valonia and oak-bark is of very excellent quality.

The tannin of valonia appears to be different from that of nut-galls, as it affords no pyrogallic acid on destructive distillation. Dr. Stenhouse found only a trace of gallic acid in this tanning material. An infusion of valonia speedily affords the deposit of "bloom."

The various parts of the oak-tree are subject to the attacks of different species of insects belonging to the genus *Cynips*. They are commonly called gall-flies, and produce various excrescences upon the leaves, stem, &c. Kirby and Spence's work on Entomology tells us that the insect that produces the gall-nut is the *Cynips Scriptorum*. They attack chiefly a species of oak very common in Asia Minor (*Quercus infectoria*), in many parts of which the galls are collected by the poorer inhabitants and exported from Smyrna, Aleppo, and other ports in the Levant, as well as from the East Indies. Ollivier says that the insect lives on this species of *Quercus* only.

In the buds at the ends of the branches and shoots of this tree the female makes a puncture with her ovipositor and deposits her egg. An excrescence or gall is soon formed, within which the larva is developed. As soon as the larva is produced, it eats its way out. In these nuts we find a little circular hole, leading to a small canal which passes to the centre of the gall. But in those galls in which the insect has not put off its pupa state, we find neither an external hole nor an internal canal. These latter nuts are called "blue galls," and are most esteemed, and are the produce of the first gathering. The galls from which the fly has escaped are called "white galls," and are of inferior quality, containing less of the astringent principle than the blue galls, in the proportion of two to three. The white and blue galls are usually imported in about equal proportions, and are then called "galls in sorts." The British oak does not yield galls of such powerful qualities as those of *Quercus infectoria*, but of late years a species of cynips has infested our oak-trees, and has produced gall-nuts in very remarkable quantities. Any observer may see them in our hedgerows, on our oak-trees, in almost every field. They are about the size of a hazel-nut, and quite smooth, and probably, if collected carefully, might be utilised in the same manner as the foreign gall-nuts. We too often overlook our native productions for those of distant shores.

The excrescences found on oak branches, commonly known as "oak-apples," are a kind of gall, and are produced in the same manner as the gall-nut, by the puncture of an insect. They are astringent, and may be used for the same purposes in the arts as the gall-nut. The oak-apples are much sought for on the 29th of May, the anniversary of the Restoration of King Charles II., and commonly known as "oak-apple day," in allusion to the fact of the royal fugitive having taken shelter in an oak. In the time of Gerard the oak-apples were consulted by the superstitious as anguries. He says: "The oke-apples being broken in sunder about the time of their withering, doe foreshew the sequell of the yeare; as the expert Kentish husbandmen have observed by the living things found in them; as, if they find an ant, they foretell plenty of graine to ensue; if a white worm, like a gentile or maggot, they prognosticate murren of beasts and cattel; if a spider, then (say they) we shall have a pestilence, or some such like sicknesse to follow amongst men. These things the learned also have observed and noted; for Matthiolus, writing upon Dioscorides, saith that, before they have a hole through them, they containe in them either a flie, a spider, or a worme; if a flie, then warre insueth; if a creeping worme, then scarcitie of victuals; if a running spider, then followeth great sicknesse and mortalitie." Galls are not of use in tanning, as is the bark of the oak-tree, for the astringent principle they contain is gallic acid, and not tannic acid, which is alone useful in the process of tanning. Tannic acid is converted into gallic acid by exposure to moisture and the atmosphere, and this latter substance forms an insoluble precipitate with the gelatine of the hides before they are tanned, and will not combine with the hide at all or convert it into leather. The tannic acid of the oak-tree seems to be changed into gallic acid by the attacks of the little insects which produce the galls; at all events, the chemical substance which they contain is always known as gallic acid. This material is used largely in medicine as an astringent, both internally and as a topical agent. It is very useful to restrain hæmorrhage, and as a gargle. This acid has the property of forming an intensely black salt, and is used in the production of black dyes for woollen cloth, calicoes, and other articles. It is also employed largely in making writing ink and in photography. When gallic acid is heated to 410 degrees Fahrenheit, pyrogallic acid is formed, and for many purposes, such as photography, this condition is preferable.

Beside the excrescences already noticed, the oak-tree is subject to several others.

There is the small round currant gall, formed on the pendent catkins; the artichoke gall, or oak strobite, probably the "oak-nut" of the ancients. It is about the size of a filbert, and resembles a fir-cone or artichoke. It is produced by the *Cynips Quercus Gemmæ*, and is a most beautiful foliose gall; for the development of the bud, although perverted, not being wholly prevented, the leaves are gradually evolved. The bedeguar, or hairy gall (*Galla capillaris*), of the ancients, is a beautiful though scarce species. In structure it is like the bedeguar, or "Robin's pincushion," of the rose-tree, and is usually situated in the axils of the leaves. Whether the "oak-wool," once so celebrated as wicks for lamps, was the same as our cottony or woolly gall is doubtful. The leaves of the oak-tree are likewise subject to the attacks of insects, and are often observed covered with curious excrescences of different forms, occasionally of a beautiful rosy colour. Oak spangles, or little red insular scales on the under side of the oak-leaf, are mentioned by Mr. Lowndes, and described by the Rev. N. T. Bree. Some writers consider them to be parasitic plants; others, the work of an insect.

A very curious legend existed at one time about the fruit of the oak-tree, which is perpetuated by its relation in Gerard's Herbal. Many old writers assert that there are "certain trees, whereon do grow certain shells, tending to russet, wherein are contained little living creatures, which shells in time of maturitie do open, and out of them do grow those little living things, which falling into the water do become fowles, which we call barnakles; but the other which do fall on the land perish and come to nothing." Now the origin of the word barnacle is said by Professor Burnet to be from "*bairn*, a child, and *aacle* or *acle*, the *aac* or oak, signifying the child or offspring of the oak. Gerard gives us a most amusing account of his having seen and touched these barnacles on old and broken pieces of wood washed up from the sea, and says: "When it is perfectly formed, the shelf gapeth open, and the first thing that appeareth is the aforesaid lace or string; next come the legs of the bird, hanging out, and, as it groweth greater, it openeth the shell by degrees, till at length it is all come forth, and hangeth only by the bill; in short space after it cometh to full maturitie and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than a mallard, and lesser than a goose, having black legs, bill or beake, and feathers black and white, spotted in such a manner as our magpie, called in some places a pie-an-net, which the people of Lancashire call by no other name than a *tree goose*; for the truth hereof, if any doubt, let them repair to me, and I shall satisfie them by the testimonie of good witnesses." This very curious fable must have originated from the fact of old pieces of oak wood being frequently found with a colony of cirripedes or barnacles attached to them, and the fibrous cirri or fringe-like appendages which hang from their shells and move about look something like the feathers of a bird, and may have misled the credulous observers of former times, who associated them with the birds feeding at the water's edge in this extraordinary manner. This story is as reliable as the more generally received notion that toads and frogs have been discovered in the heart of ancient trees embedded in the wood, but yet alive, having been enclosed in that position for centuries. In order to prove that such a condition of life was impossible, Dr. Buckland some years ago tried the experiment, and enclosed three toads of moderate size in the trunk of a tree, in holes made air-tight, but large enough not to crush them. At the end of a year every one of the toads thus pegged in the knotty entrails of the tree was found dead and decayed. The oak is the badge of the Scotch clan Cameron.

SUB-SPECIES II.—*Quercus sessiliflora*. *Salisb.*

PLATE MCCLXXXIX.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXLIV. Fig. 1309.

G. Robur, Willd. Reich. Ic. l. c. p. 7.

G. Robur, var. β, sessiliflora. Hook. & Arn. Brit. Fl. ed. viii. p. 417. *Bab. Man. Brit. Bot. ed. vi.* p. 319. *Benth. Handbk. Brit. Fl. ed. ii.* p. 422.

Leaves conspicuously stalked, regularly sinuate-pinnatifid; lobes generally divided less than half-way down to the midrib, and becoming smaller towards or not extending to the apex, the sinus between them commonly forming nearly a right angle or an obtuse angle. Fruit peduncle shorter than the acorn, and usually shorter than the petiole.

Var. *α, genuina*.

Q. sessiliflora, Leight. Fl. Shrop. p. 474.

Petioles long. Peduncle shorter than the cup of the acorn.

Var. *β, intermedia*.

G. intermedia, Don.; Leight. Fl. Shrop. p. 473.

Petioles rather short. Peduncle longer than the cup of the acorn.

In woods, copses, hedgerows, &c. Less common than *Q. pedunculata*, though as widely distributed. Apparently rare and local in Ireland, and only known to occur in the north.

England, Scotland, Ireland. Tree. Spring.

Generally a smaller tree than *Q. pedunculata*, with the leaves larger, broader, flatter, and with more of the aspect of those of the sweet-chestnut, the petiole longer, and the base more gradually attenuated into it; besides this, the acorns are on peduncles so short as to be almost sessile, at the same time the two subspecies appear to pass insensibly into each other, as shown in a paper by the late Dr. Greville in *Trans. Bot. Soc. Edin.* vol. i. p. 65.

Sessile-fruited Oak.

French, *Chêne à fruits sessiles*. German, *Trauben-Eiche*.

In comparing the wood of the two species of British oak, that of *Q. pedunculata* is found the most easy to split, and the stiffest and easiest to break, and yet the most difficult to bend, while that of *Q. sessiliflora* has the advantage in toughness and weight. Notwithstanding this comparison, the wood of both kinds is used indiscriminately for all purposes, and the remarks made on the former species are equally applicable to the present one. The beauty of oak foliage is universally allowed, but that of *Q. sessiliflora* may be said to be most admired in single leaves, and that of the other species in tufts of leaves. This species is known by the name of Durmast, and the characteristics of its wood are said to depend on the smaller proportion of silver

grain or flower (terms used by carpenters and others to signify the medullary rays of botanists) possessed by the wood of the durmast in comparison with that of the other kind. On this account the wood of the durmast has frequently been confounded with that of the sweet chestnut, and for this reason it is less valuable for the purposes of the cabinet-maker than the wood of *Q. pedunculata*, in which the silver grain is much more conspicuous. The timber of the durmast has been stated, on insufficient grounds, to be less durable than that of the common oak. The wood of these trees, when stained green by the growth of a peculiar fungus, *Peziza aruginosa*, is highly prized by cabinet-makers and workers in Tunbridge ware.

The genus *Quercus* yields several other valuable forest trees besides those of our own islands. *Quercus suber*, a native of Southern Europe and Northern Africa, furnishes cork. In Lindley's "Treasury of Botany" it is stated that "the false sandalwood of Crete is the produce of *Q. abelicea*." There are many Japanese oaks, the timber of which is splendid. *Q. tinctoria*, a North American species, yields quercitron bark, employed for dyeing yellow. We have mentioned the acorn-cups produced by *Q. Megilops*, and imported into this country as a dye. *Quercus Ilce* is an evergreen species much cultivated in Great Britain, but liable to suffer from our severe frosts. The galls of *Q. infectoria* are considered the best in commerce, and the same tree also furnishes the galls known as Mecca galls, which are supposed to be the Dead Sea apples or apples of Sodom, the fruit that never comes to ripeness, so pleasant to the eye, so bitter to the taste. In the midland counties of England there is always much speculation as to whether the leaves of the oak or of the ash will appear first, as the following proverb is implicitly relied on:—

"If the oak's before the ash,
Then you'll only get a splash;
If the ash precedes the oak,
Then you may expect a soak."

Considering the different habits of the two trees, there may be reason in the rhyme. The oak sends its roots deep into the soil, and its leafing is advanced or retarded by a warm or cold spring. The roots of the ash are nearer the surface, and so a wet spring hastens its growth, while a dry one would retard it. Rain, moreover, does not affect the oak so much as it does the ash. A curious phenomenon is sometimes presented by the oak, which is mentioned by Mr. White in his "Natural History of Selbourne." We hear, in country districts, of "raining trees," especially of "raining oaks," and Mr. White accounts for the fact in this way: "In heavy fogs, in elevated situations especially, trees are perfect alembics, and no one who has not attended to such matters can imagine how much water one tree will distil in a night's time by condensing the vapour, which trickles down the twigs and boughs, so as to make the ground below quite in a float. In Newton Lane, in October 1775, on a misty day, a particular oak in leaf dropped so fast that the cartway stood in puddles, and the ruts ran with water, though the ground in general was dusty."

GENUS II.—CASTANEA. *Tournef.*

Male flowers in long rather slender interrupted stiff catkins, with catkin scales and bracteoles at the base of each of the glomerules of which the catkin is composed: scales combined into a cuplike floral perianth (?) with 5 or 6 segments: stamens 8 to 12, inserted on a

glandular disk at the base of the perianth. Female flowers 2 to 5 together, rarely solitary, surrounded by a common bellshaped involucre, the outside of which is furnished with numerous linear bracts imbricated in many rows: perianth completely adherent to the ovary, and produced beyond it, the limb with 5 to 8 teeth: stamens rudimentary: ovary with 3 to 8 cells; ovules 2 in each cell; styles very short and thick; stigmas as many as the cells of the ovary, ascending. Nuts ovate-ovoid or subglobose, acuminate, usually compressed, 2, more rarely 3 or 5 enclosed in a common coriaceous bristly-spiny subglobular involucre, which opens by 4 valves; pericarp tough and leathery. Cotyledons filling the seed, folded, coherent, farinaceous.

Trees with scaly buds and deciduous spinous-dentate leaves. Flowers monœcious, appearing after the leaves.

The name of this genus of plants is derived from *Castāna*, a town in Thessaly, where it was abundant, or, as some authors say, from another town of that name in Pontus.

SPECIES I.—**CASTANEA VULGARIS.** *Lam.*

PLATE MCCXC.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXL. Fig. 1305.

Billot, Fl. Gall. et Germ. Exsicc. No. 2531.

C. vesca, *Gärtn.* *Reich.* l. c. p. 6.

C. sativa, *Mill.* *Crep.* Man. Fl. de Belg. ed. ii. p. 666.

Fagus Castanea, *Linn.* *Sm.* Engl. Bot. ed. i. No. 886.

Leaves elliptical or oblong-elliptical, acuminate, serrate with the serratures mucronate, glabrous above and below.

In woods and copses, but having scarcely any claim to be considered native, unless possibly so in the south and west of England. In Scotland its fruit rarely ripens, even in the latitude of Edinburgh.

[England, Scotland, Ireland.] Tree. Early Summer.

A large tree with spreading branches, attaining a height of 50 feet or more, the old bark deeply cleft. Leaves on petioles rarely above an inch long; the lamina 5 to 9 inches, with numerous veins running straight from the midrib to the margins, and terminating in the bristly points of the serratures. Flowers produced on the shoots of the year; male catkins 4 to 8 inches long, ascending, with a stiff rachis, on which the glomerules are placed at short distances from each other: stamens long; anthers pale yellow. Female flowers shortly stalked or sessile: involucre 4-partite. In fruit the involucre becomes enlarged, somewhat woody, thickly clothed on the outside with unequal bristly spines, and containing 2 or 3 smooth nuts attached by a large basal scar. Leaves bright green, shining above, paler beneath.

Sweet Chestnut.

French, *Châtaigner commun*. German, *Essbare Kastanie*.

The sweet chestnut is probably not indigenous to Britain, but it must have been introduced at a very early period, and is said to have been brought to Europe by the Greeks from Sardis in Asia Minor, about 504 B.C. Theophrastus mentions that in his time Mount Olympus was nearly covered with chestnut trees, and Pliny enumerates eight kinds that were known to the Romans in his day. He tells us that chestnuts were ground into flour and made into bread by the poor. The chestnut tree grows in Britain to as large a size as the oak, which, when old, it somewhat resembles. It is probable that the sweet chestnut was introduced into Britain in the time of the Romans for the sake of its fruit; there are some old trees still standing which were probably planted at that time. A fine old tree at Tortworth, in Gloucestershire, is mentioned in a record of the time of Stephen as of great age, forming one of the boundaries of the manor, and is supposed by Strutt to have been in existence in the time of Egbert, more than a thousand years ago. The oldest tree in the neighbourhood of London is that at Cobham, in Kent, and the town of Cheshunt, in Hertfordshire, is said to have derived its name from the number of chestnut trees that formerly grew there.

It would seem, however, that at one time chestnut trees were comparatively scarce in England, for in an old tract entitled, "An Old Thrift Newly Revived," published in 1612, the author recommends planting the chestnut "as a kind of timber tree, of which few grow in England," and which, he adds, will not only produce "large and excellent good timber, but good fruit, that poore people, in time of dearth, may, with a small quantitie of oats or barley, make bread of." He also adds, "When you first begin to plant it, it will grow more in one yeare than an oake will doe in two. Mr. London tells us that Hartlib, who wrote early in the seventeenth century, says, "In divers places of Kent, as in and about Gravesend, in the countrey and elsewhere, very many prime timbers of these old barns and houses are of chestnut wood; and yet there is now scarce a chestnut tree within twenty miles of the place, and the people altogether ignorant of such trees. This sheweth that in former times those places did abound with such timber."

In the year 1676 an ancestor of the family of Wyndham, of Felbrigg, in Norfolk, was said to be a great planter of chestnuts, which in about fifty years' time were thinned and applied to useful purposes. The tree, however, was comparatively neglected till the end of the last century, when the Society of Arts, reviving the idea that the carpentry of many of our old buildings consisted of chestnut wood, offered rewards for planting the tree, and these were given to a number of individuals who made plantations of it. Much of the wood, however, that is supposed to be chestnut in our old buildings is now thought to be oak, and Buffon demonstrates that oak-wood, after a number of years, puts on the appearance of chestnut; and in 1780 two French observers, Fongereux and Daubenton, showed that the wood of *Quercus sessiliflora* had been constantly mistaken for that of the sweet chestnut. This error has given the chestnut wood a reputation for durability which it does not deserve. Evelyn observes, "The chestnut is, next the oak, one of the most sought after by the carpenter and joiner. It hath formerly built a good part of our ancient houses in the City of London, as doth yet appear." The author of the "Sylva" adds, "If the timber be dipped in scalding oil and well pitched, it becomes extremely durable, but otherwise I cannot celebrate the tree for its sincerity, it being found that, contrary

to the oak, it will make a fair show outwardly, when it is all decayed and rotten within; but this is in some sort recompensed, if it be true that the beams made of the chestnut tree have this property, that being somewhat brittle, they give warning, and premonish the danger by a certain crackling; so as it is said to have frightened those out of the baths at Antandro, whose roof was laid with this material, but which Pliny says was of hazel, very unlike it." But though far more brittle and perishable than it was formerly considered, chestnut is by no means so worthless a wood as modern writers have represented it. In fences it seems as durable as most other woods, posts of it having stood little injured for forty or fifty years; and in houses and outbuildings it has been known to last as long, even where exposed to weather. The wood of the chestnut has the remarkable property of being more durable when it is young than when it is old; and Mr. Kent, in the "Transactions of the Society of Arts in 1792," observes, "When the chestnut is suffered to stand beyond its full growth it is the worst of all timber, being more brittle and more apt to fly into splinters than any other; but I have never known this to be the case with young chestnut." Hence he directs the tree to be cut when it is in a growing or healthy state, because it is "so early useful, that if it be cut when it squares only six inches, it will be as durable as an oak of six times its size and age." French writers state that chestnut wood is a good deal used for making wine-casks, a circumstance noticed by Rapin, in his poem entitled "The Garden:"—

"With close-grain'd chestnut wood of sovereign use,
For casking up the grape's most powerful juice."

Wine is said to ferment in chestnut casks more slowly, and be less likely to evaporate than in vessels of any other wood. According to Du Hamel, there is no wood which makes better hoops, as it resists the dry rot in cellars. As fuel, the wood of chestnut is not much approved; it throws out sparks and smoulders rather than flames, and the charcoal is not of the first quality. Michaux informs us that the ashes of the wood furnish a great deal of potash. The bark is used for tannin, but it only sells for half the price of that of oak. The leaves in country places in France are used as a litter for cattle, and when dried they are made, like beech leaves, into beds for the poor. "But these leafy beds," says Evelyn, "for the crackling noise they make when one turns upon them, the French call *lits de parlement*." As a fruit tree, the chestnut is not estimated in England, according to its worth, the nuts being seldom eaten but as a desert, and then in only one universal form, plainly roasted, and occasionally as a stuffing for turkeys or fowls. Possibly if the fruit attained a greater perfection in this climate, it might be more generally used, as it is in France and other countries in the south of Europe. The seeds or nut, as they are commonly called, contain large quantities of oil, and in Italy and the south of France serve as a substitute in a great measure for potatoes and bread. Evelyn writes, "We give that fruit to our swine in England which is amongst the delicacies of princes in other countries; and being of the larger nut, is a lusty and masculine food for rustics at all times, and of better nourishment than cale and rusty bacon, yea, or beans to boot. How we here use chestnuts in stewed meats and beatille pies, our French cooks teach us; and this is, in truth, their very best use, and very commendable; for it is found that the eating them raw or in bread, as they do in Limousin, is apt to swell the belly, though without any other inconvenience, that I can learn; and yet some condemn them as dangerous for such as are subject to the gravel in the kidneys; and however cooked and prepared, flatulent, offensive to the head and stomach, especially to those who are subject to the cholick. The best way to preserve them is to

keep them in earthen vessels in a cold place. Some lay them in a smoak loft, others in dry barley straw, others in sand, &c." One of the modes of drying chestnuts in order to preserve them for several years, is to place those which have been collected from the ground on coarse sieves in a dry place, and afterwards expose them to the sun, or to boil them for a quarter of an hour, and then dry them in an oven. In Limousin and Périgord, where the chestnut flour is used, for making the kind of cake called *la galette*, and the thick porridge called *la polenta*, which are the common food of the peasantry, the chestnuts are dried with smoke. A thin layer of seeds or nuts which have been deprived of their outer husks, is laid on a kind of kiln pierced with holes, and a fire is made below with the husks and part of the wood of the tree, which is only permitted to smoulder, and is not suffered to burst into a flame. In a short time the chestnuts begin to sweat: the fire is then extinguished, and they are allowed to cool. They are then thrown aside, and a fresh layer spread out. When a sufficient quantity of chestnuts is thus prepared to cover the floor of the kiln at least one foot deep, they are laid upon it, and a gentle fire is made below, which is gradually augmented during two or three days, and is then continued during nine or ten days, the chestnuts being regularly turned like malt, till the nuts part readily from their skins; they are then put into sacks, which have been previously wet, and thrashed with sticks, or rubbed upon a large bench or table, after which they are winnowed, and are then ready for the mill. During the process of drying, the fire is watched night and day, and the under side of the floor of the kiln (or hurdles, if these have been used as a substitute for a paved floor) must be frequently swept to clear it from the soot. The dust which escapes from the chestnuts when they are winnowed, together with the broken nuts, are carefully preserved for feeding cattle, and are called in France *biscat*. The usual modes of cooking chestnuts in France are boiling them in water simply with a little salt, or with leaves of celery, sage, or any other herbs, to give them a flavour, or roasting them in hot ashes or a coffee-roaster. In whatever way they are cooked, the French cook always slits the skin of all but one, and when that cracks and flies off, it is a sign that the rest are done.

Chestnut flour will keep good for years in casks or earthen bottles well protected from the air. Chestnuts well boiled in water, and then broken and mashed up like potatoes, form a good dish, and a sweetmeat common in the confectioners' shops in Paris, known as *marrons glacés*, is made by dipping the chestnuts into clarified sugar, and then drying them. Evelyn says that in his time "the best tables in France and Italy make chestnuts a service, eating them with salt in wine, or pine of lemons and sugar, being first roasted in embers on the chaplet. In Italy they boil them in wine, and then smoke them a little. These they call *anvere* or geese: I know not why. Those of Piedmont add fennel, cinnamon, and nutmeg to their wine, but first they peel them. Others macerate them in rosewater. The bread of the flour is exceedingly nutritive; it is a robust food, and makes women well complexioned, as I have read in a good author. They also make fritters of chestnut flour, which they wet with rosewater, and sprinkle with grated parmigians, and "so fry them in fresh butter for a delicate." Evelyn also says, that the flour of chestnuts made into an electuary with honey, and eaten fasting, is an approved remedy against spitting of blood and the cough: and a decoction of the rind of the tree tinctures hair of a golden colour, esteemed a beauty in some countries." The prescription is also given by Gerard in his Herbal. Sugar is said to have been obtained from chestnuts in France by the same process as is used for the extraction of sugar from beet, and at the rate of 14 per cent., which is more than the average produce of the best root. Lately we

have seen a remedy in use externally for rheumatism on the Continent, known as *huile de marrons*. It is somewhat expensive, but is supposed to be very effectual.

We find frequent allusions to the chestnut tree by the old poets. Virgil often mentions it, and we have Dryden's version of a passage occurring in the second Eclogue before us :—

“Myself will search our planted grounds at home
For downy peaches and the glossy plum,
And thrash the chestnuts in the neighbouring grove,
Such as my Amaryllis used to love.”

The old English poets frequently allude to the chestnut. Herrick says :—

“Remember us in cups full crowned,
And let our city health go round,
Quite through the young maids and the men,
To the ninth number, if not ten,
Until the fired chestnuts leap
For joy to see the fruits ye reap
From the plump chalice and the cup
That tempts till it be tossèd up.”

Ben Johnson speaks of the “chestnut whilk hath larded many a sconce.” Shakespeare, in “Macbeth,” writes of “a sailor's wife with chestnuts on her lap;” and Milton alludes to the custom of roasting chestnuts :—

“While hisses on rug-hearth the pulpy pear
And black'ning chestnuts start and crackle there.”

Philip tells us that in Catalonia a custom prevails of people going from house to house on All Saints' Eve, believing that every chestnut they eat in a different house will free a soul from purgatory.

As an ornamental tree in landscape, the chestnut is picturesque and beautiful. It is this tree which graces the landscapes of Salvator Rosa. In the mountains of Calabria, where he painted, it flourished. There he studied it in all its forms, breaking and disposing it in a thousand beautiful shapes, as the exigencies of his composition required. In parks, the chestnut is displayed most to advantage when standing singly, or in scattered groups with the oak. Bose says :—“As an ornamental tree, the chestnut ought to be placed before the oak. Its beautiful leaves, which are never attacked by insects, and which hang on the tree till very late in the autumn, mass better than those of the oak, and give more shade. An old chestnut standing alone produces a superb effect. A group of young chestnuts forms an excellent background to other trees, but a chestnut coppice is insupportably monotonous.” In Britain the tree will not attain any height but in sheltered situations, and when the soil is free and of some depth; but in poor gravelly soil, where its roots will only run along the surface, it will attain a very considerable diameter of trunk, and be of great longevity, though its head may never be larger than a pollard. Of this the chestnut trees in Greenwich Park and Kensington Gardens may be cited as proofs. We must not confound with this tree the horse-chestnut, *Æsculus Hippocastanum*, which belongs to a very different family, and is so well known and so easily recognised by its compound quinate leaves, and its superb pyramids of beautiful white flowers. The only resemblance between the two trees is in the fruit, the nuts of the Spanish or eatable chestnut being about the same in size and of the same colour (though not so polished) as the

seeds of its magnificent rival. The husks of the sweet chestnut are like hedgehogs, while those of the horse-chestnut have scarcely any prickles. Moreover, the sweet chestnut is usually flat on one side, and often upon two sides, owing to several nuts having stood side by side in the involucre, and at the apex there are seen the withered styles and stigmas. The seeds of the horse-chestnut, on the other hand, have a perfectly round and even surface, showing only a broad scar at the part where they were attached to the inside of the capsule.

GENUS III.—**FAGUS**. *Tournef.*

Male flowers in compact subglobular catkins, with very small caducous catkin-scales: floral-scales combined into a cuplike perianth (?) with 5 or 6 segments: stamens 8 to 12, inserted on a glandular disk at the bottom of the perianth. Female flowers 2 to 3 together, rarely solitary, surrounded by a common urceolate involucre, the outside of which is furnished with numerous linear bracts imbricated in many rows: perianth completely adherent to the ovary and produced beyond it, the limb laciniate, with 5 to 8 segments: ovary with 3 cells; ovules 2 in each cell; styles 3, with the stigmas lateral, erect, but slightly recurved at the apex. Nuts ovoid-triquetrous, 2, more rarely 1 or 3, enclosed in a common coriaceous bristly-spiny ovoid involucre, which opens by 4 valves; pericarp tough and leathery. Cotyledons irregularly folded, filling the seed, coherent, fleshy.

Trees with long slender scaly buds and deciduous repand or serrate leaves. Flowers monœcious, appearing with or shortly after the leaves.

The derivation of the name of this genus is from the Greek word *φαγεῖν* (*phagein*), to eat, because the nuts were used as food in the early ages.

SPECIES I.—**FAGUS SYLVATICA**. *Linn.*

PLATE MCCXCI.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXXIX. Fig. 1304.

Leaves oval, obsoletely serrate, pilose on the petioles, veins, and margins, especially when young.

In woods and on chalky hills. Not uncommon, and doubtless truly native in the south of England; probably not native in the north and in Scotland. Not indigenous in Ireland.

England, [Scotland, Ireland]. Tree. Late Spring and early Summer.

A large tree, growing to 50 or 80 feet high, or even more, with spreading flexuous branches and very smooth grey bark. Buds with

very long slender brown scales. Leaves on petioles commonly about $\frac{1}{2}$ inch long; the lamina 2 to 3 inches, shortly acuminate, somewhat plicate, with 6 to 8 veins running straight from the midrib to the margins. Stipules scarious, resembling the bud scales, very caducous. Flowers appearing with the young leaves, on the shoots produced from buds of the preceding year. Male catkins on stalks 1 to 2 inches long, pendulous, ovoid, with very long weak stamens and pale yellow anthers. Female flowers above the male, on stout peduncles, generally shorter than those of the male catkins. Involucre in fruit 4-cleft, hairy with numerous subulate bristles or processes. Nuts orange-brown, $\frac{3}{4}$ inch long, triquetrous, smooth and shining, with a small triangular basal scar. Leaves deep green, shining above, paler beneath. The cotyledons are remarkable in germination for their great breadth, which makes them pseudo-connate.

Common Beech.

French, *Hêtre fuyard*. German, *Roth Buche*.

This is one of the most useful, and perhaps the most beautiful, of our woodland trees. Its appearance is familiar to most people, and it is one of the few trees whose features are so marked that our artists find no difficulty in transferring it to canvas, and making it recognisable. Gilpin, however, does not consider the beech tree as the most picturesque of our forest trees. He finds fault with its skeleton, with its knotted and irregular trunk, and says, "The branches are fantastically wreathed and disproportioned, turning awkwardly among each other, and running often into long unvaried lines, without any of the strength and firmness that we admire in the oak, or of that easy simplicity which pleases us in the ash; in short, we rarely see a beech well ramified. In full leaf it is equally unpleasing; it has the appearance of an overgrown bush. Virgil, indeed, was right in choosing the beech for its shade. No tree forms so complete a roof. This bushiness gives great heaviness to the tree, which is always a deformity. What lightness it has disgusts. You will see a light branch issuing from a heavy mass, and though such pendent branches are often beautiful in themselves, they are seldom in harmony with the tree. On the whole, the massy full-grown luxuriant beech is rather a displeasing tree."

We cannot agree with these severe remarks, and we are glad to find that a different view is taken of the merits of the beech tree by other writers. Sir T. D. Lauder observes on Gilpin's observations, that they afford "one of the instances in which the author's love for the art of representing the objects of nature with the pencil, and his associations with the pleasures of that art, have very much led him astray." He adds, "Some of the very circumstances which render it unpicturesque, or, in other words, which render it an unmanageable subject of art, highly contribute to render it beautiful. The glazed surface of the leaf, which brightly reflects the sun's rays, and the gentle emotions of light, if we may venture so to express ourselves, which steal over the surface of its foliage, with the breathing of the balmy breeze, although difficult, or rather impossible, to be represented by the artist, are accidents which are productive of very pleasing ideas in the mind of the feeling observer of nature." "They make spreading trees and noble shades," says old Evelyn. Mr. Loudon quotes Sir T. D. Lauder, who says, "We remember to have been much gratified with the effect of this tree when all other trees were absent; it was in Italy, on the very summit of the Valombrosan Appenines. During our progress through the scorching

plains of Italy we had seen nothing to resemble the green sward of a British lawn. What was our agreeable surprise then, when on emerging from the upper boundary of those forests of chestnuts and other trees which cover the declivities of the mountains, we entered at last on a beautiful sloping and undulating lawn, composed of shaven turf of the richest possible verdure, everywhere surrounded by fine spreading beeches, running into the open ground in irregular promontories, and receding in bays, in which the velvet surface of the pasture stole gradually into the cool shade! The whole was like a scene of magic. It was like a perfect and well-kept English park: and this produced by the enchanting hand of Nature, on the summit of the Appenines. We selected the most pleasing spot we could find on the very top; and there, under the umbrageous cover of one of the largest trees, we ate our well-earned meal, where the boundless prospect gave to our wondering and delighted eyes the view of the waters of the Mediterranean on the one side, and those of the Adriatic on the other. We must confess that we have hardly ever seen a beech tree since without its bringing to our recollection the enjoyments of that most celestial day, and the reader will easily be able to trace the combination of pleasing associations which made it so."

The beech was known both to the Greeks and Romans. Pliny writes of it, and Virgil tells us that the beech was grafted on the chestnut. Pliny mentions a grove of beech trees at Jerusalem, which in old times was consecrated to Diana, and one of these trees was of such surpassing beauty that Papienus Cyprianus, a celebrated orator, who was twice consul, and afterwards married the Empress Agrippina, was so fond of it that he not only delighted to repose beneath its shade, but frequently poured wine on the roots, and used often to embrace it. Beechen cups were used by the Latin shepherds, and this custom is frequently alluded to by the poets. The oldest writers on British rural affairs mention the beech as one of the four indigenous timber trees of England. The wood of the beech is very close-grained, hard, and heavy. It lasts well if kept dry, or constantly submerged; but if exposed to the alternations of drought and moisture, it soon decays. It is therefore not fit either for house or ship-building, and is considered inferior timber to that of the oak, the ash, or the elm. The uses of the wood, notwithstanding all its faults, are very extensive. The keels of vessels are often made of it, and the planks for the sides and bottoms of ships. It is in great demand for cheap furniture, mill-work, screws, and wooden machinery of all kinds, and for the various articles manufactured by the cooper and turner. Its durability under water renders it peculiarly applicable for piles, weirs, sluices, and similar work intended to be constantly wet. The same quality recommends it for the wooden soles of shoes and pattens, while in France it is preferred to any other wood for making sabots, being not only durable when wet, but little likely to absorb moisture. The consumption of sabots in the mountainous districts of France, according to Bose, is immense. They are made of the green wood of the beech, and then smoked with the burned chips formed in their construction. This smoke, containing a great deal of moisture, does not crack them, while the pyroligneous acid and creosote which are given out in large quantities, penetrate the sabots, and renders them durable and less liable to be attacked by insects. The sabots so treated are always of a brownish colour, the effects of this process. In Germany thin slices of beech-wood are used by the bookbinders instead of pasteboard, for forming sides to thick volumes, which, from the German name of this wood, *buch*, were originally called *books*.

As fuel, the wood of the beech is superior to any other. It yields a large amount of heat, burns more clearly and brightly, and with less smoke, than almost any other. As it contains but one-tenth its weight of water, it may be consumed in the green

state as well as in the dry. In France and Germany, where wood is the prevailing fuel, this beech-wood is used largely for the purpose. When carbonised, it forms excellent charcoal, which is capable of being manufactured into gunpowder, though inferior to the lighter kinds.

The leaves, gathered green and dried, were formerly used in Britain, and still are on the Continent, for filling beds. Evelyn says, "Being gathered about the fall, and somewhat before they are much frost-bitten, they afford the best and easiest mattresses in the world to lay under our quilts, instead of straw, because, besides their tenderness and loose-lying together, they continue sweet for seven or eight years, long before which time straw becomes musty and hard. They are used by divers persons of quality in Dauphiné and in Switzerland. I have sometimes lain on them, to my very great refreshment. So as of this tree it may very properly be said, 'the wood as house, the leaves a bed.'"

The triangular nut-like fruit of the beech, called beech-mast in England, and *la faine* in France, has a taste somewhat like that of the hazel-nut. It contains a large quantity of fixed oil, together with starch and sugar, and is very nutritious and fattening to oxen, swine, and poultry. The flesh of pigs which are fed on it does not keep so well as that of those fattened on acorns. The fat also is more oily and more liable to waste. Beech-mast is much sought after by wild animals, particularly by badgers, by squirrels, and dormice, which last Evelyn says, "Harbouring in the hollow trees, grow so fat that in some countries abroad they take infinite numbers of them, I suppose, to eat." In Britain the only use made of the mast is to turn swine, deer, and poultry into beech-woods to pick it up; but in France it forms an important article of domestic consumption for making oil. It is considered not only good for burning in lamps, but for cooking purposes, especially for frying fish. The seed is gathered when quite ripe by shaking the branches of the tree, and collecting the fruit in a cloth spread below. It is dried under cover, and ground into paste in a mill; the mass is then subjected to pressure in bags of hair or linen; one-sixth part of the weight of the dry seed is sometimes obtained; but the produce varies according to the season. In the reign of Queen Anne, one Aaron Hill, a poet, formed a company for the extraction of oil from beech-nuts, and proposed to pay off the National Debt with the profits; but after the expenditure of much money, it shared the fate of so many more modern schemes, and fell to the ground. It is probable that a warmer climate than ours is required for the full development and ripening of the beech-mast, so as to make it valuable for oil. The cake left after the extraction of the oil is an excellent cattle food, but seems to disagree with horses, on account of a peculiar principle which exists in the seed, and is called *fagine*, and possesses narcotic properties.

The bark of the beech contains a considerable quantity of tannin and gallic acid, but is not so valuable for tanning leather as that of many other trees. The young branches and waste wood are largely consumed in the manufacture of acetic or pyro-ligneous acid; they likewise yield a considerable quantity of potash.

The finest beech trees in Britain are said to grow in Hampshire, and there is a curious legend respecting those in the Forest of St. Leonard, in that county. This forest, which was the abode of St. Leonard, abounds in noble beech trees, and the Saint was particularly fond of reposing under their shade, but when he did so he was annoyed during the day by vipers, and at night by the singing of the nightingale. Accordingly, he prayed that they might be removed; and such was the efficacy of his prayers that since his time in that forest

"The viper has ne'er been known to sting,
Or the nightingale e'er heard to sing."

The beech tree is remarkable for the extraordinary and tortuous growth of its branches, and the knotted and rough appearance of the stems. The bark, however, is remarkably smooth and shining, and peculiarly tempting to the rustic carver. Poets in many verses have recognised the favourite custom of carving names on the bark of the beech trees. Shakespeare says, "A man haunts the forest that abuses our young trees with carving Rosalind upon their bark." And we read in Luis de Gongora that

"Not a beech but bears some cipher,
Tender word or amorous text.
If one vale sounds Angelina,
Angelina sounds the next."

Our own poet Campbell avails himself of the 'plea of long-cherished names in his appeal on behalf of the beech tree:—

"Thrice twenty summers have I stood
In bloomless, fruitless solitude;
Since childhood in my rustling bower
First spent its sweet and sportive hour;
Since youthful lovers in my shade
Their vows of truth and rapture paid;
And on my trunk's surviving frame
Carved many a long-forgotten name.
Oh, by the vows of gentle sound
First breathed upon this sacred ground;
By all that love hath whispered here,
Or beauty heard with ravished ear;
As love's own altar honour me!
Spare, woodman, spare the beechen tree."

Virgil alludes to this practice of carving letters on the beech tree. In Dryden's translation we read—

"Or shall I rather the sad verse repeat
Which on the beech's bark I lately writ?"

Tasso's well-known lines say—

"On the smooth beechen rind the pensive dame
Carves in a thousand forms her Tancred's name."

We read of "beechen goblets" in several well-known verses. Milton writes—

"In beechen goblets let their bev'rage shine,
Cool from the crystal spring their sober wine."

And Cowley speaks of the happy times when

"The beechen bowl without debauch went round,
And was with harmless mirth and roses crowned;
'Twas not that any virtue in the wood
Against the baneful liquor was thought good,
But poverty and innocence were here
The antidote against all ills and fear."

Gray says—

“There at the foot of yonder nodding beech
That wreathes its old fantastic roots so high,
His listless length at noontide he would stretch,
And pore upon the brook that bubbles by.”

Wordsworth writes—

“A single beech tree grew
Within the grove of firs; and in the fork
Of that one beech appeared a thrush's nest—
A last year's nest, conspicuously built,
Of such small elevation from the ground
As gave sure sign that they who in that house
Of nature and of love had made their home
Amid the fir trees all the summer long,
Dwelt in a tranquil spot.”

The beech tree often attains to a great size. Mr. Jesse, in his account of forest trees, mentions one near Sawyer's Lodge in Windsor Forest, which measures at six feet from the ground thirty-six feet in circumference. It is now protected from injury, and nature seems to be doing her best to repair the damage which its exposure to the attacks of man and beast has produced. It must once have been hollow, but the vacuum is nearly filled up. One might almost fancy that liquid wood which had afterwards hardened had been poured into this tree. The twistings and distortions of this huge substance have a curious and striking effect. There is no bark on this extraneous substance, but the surface is smooth, hard, and without any appearance of decay. Dr. Withering says, “In the ‘Arctic Zoology’ is described, on an island of the Lake Wetter, and about the extreme range of these trees northward, a majestic plant called the Twelve Apostles, from its dividing into as many great stems. Only eleven of these are now standing, for some years since a zealous peasant cut down one of them, declaring that the traitor Judas should have no part with his brethren! The names of many distinguished visitors are recorded on the bark of this surpassing tree, among which are those of Charles XI. and XII., Queen Eleanora, &c.” The largest beeches now existing in England are the Studley Beech and the Knowle Beech. The Burnham Beeches are well known, and stand in a tract of woodland above four miles from Stoke Pogis in Buckinghamshire, which is celebrated as the scene of Gray's poetic musings.

The beech tree shelters and its shade is the favourite locality of two well known and valuable fungi—the *Morchella esculenta*, the morel, and *Tuber cibarium*, the common truffle. The morel is a mushroom-like fungus, growing in great abundance in the forests of Germany and France, particularly after any of the trees have been burned down. This having been observed, led in Germany to the burning of woods in order to produce morels, and consequently great numbers of valuable trees were destroyed, until it was forbidden by law. This fungus is used chiefly in a dried state to give flavour to dishes, and many persons gain their living by finding and drying the morels, which they do by running a thread through them and hanging them in an airy place. In England they are comparatively rare, but Mr. Berkeley tells us that in Kent they are so abundant as to be used for making catsup. The common truffle, *Tuber cibarium*, is, if possible, more highly prized than the morel, it is also more difficult to find, as instead of appearing above the surface like a mushroom, it is buried in the ground like a potato. They are generally found by dogs or pigs trained for the purpose.

Kromholz gives the following instructions for the benefit of those who undertake the search :—"You must have a sow, of five months old, a good walker, with her mouth strapped up, and for her efforts recompense her with acorns; but as pigs are not easily led, are stubborn, and go astray, and dig after a thousand other things, there is but little to be done with them. Dogs are better: of these select a small poodle." The high price of, and constant demand for, truffles, both in France and other countries, make truffle-hunting a very profitable employment, and experienced hunters are rarely deceived in the places where they search. In England they are tolerably abundant on light soil, but they are very rare in Scotland. The truffles of commerce are generally those of Périgneux and Angoulême. The artificial culture of truffles does not succeed, they are never produced in larger quantities or of finer quality than in their native woods. Truffles are never eaten raw; when fresh they are cooked like mushrooms, or capons or turkeys are stuffed with them; but they are principally used dry for flavouring ragoûts and other dishes.

There are some beautiful varieties of the beech to be seen in cultivation, among which the red or purple and the copper-coloured beech, and the fern beech with curiously cut leaves, are very attractive.

GENUS IV.—**CORYLUS.** *Tournef.*

Male flowers in compact cylindrical catkins with imbricated catkin-scales: floral-scales 2, adnate to the catkin-scale, and with only the summit free: stamens 8, inserted at different heights along the suture of the 2 floral-scales. Female flowers solitary or in pairs in terminal scaly buds, each flower or pair of flowers surrounded by a bellshaped involucre, which is smooth on the outside, but lacinate at the apex: perianth completely adherent to the ovary, and not produced beyond it, the limb very short and denticulate: ovary 2-celled, with 1 ovule in each; styles 2, stigmatiferous throughout, erect. Nut ovoid or oblong-ovoid, solitary, 1-celled and 1- (rarely 2-) seeded, wholly or partially enclosed in a coriaceous or subfoliaceous cupule, with a lacinate margin; pericarp woody. Cotyledons filling the seed, plano-convex, fleshy.

Shrubs with herbaceous-scaled buds and deciduous serrate leaves. Flowers monœcious.

According to some writers, the name of this genus of plants comes from the Greek *κόρυς*, a helmet, the fruit with its involucre appearing as if covered with a bonnet; and, according to others, it is derived from the Greek word *κόρυς*, a nut.

SPECIES I.—**CORYLUS AVELLANA.** *Lin.*

PLATE MCXCII.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXXXVI. Fig. 1300.

Billot, Fl. Gall. et Germ. Exsicc. No. 459.

Leaves oval-suborbicular, cordate, abruptly acuminate or cuspidate.

Stipules oblong, obtuse. Cupule in fruit open and irregularly laciniate, about as long as the nut.

In woods, thickets, and hedges. Common, and generally distributed.

England, Scotland, Ireland. Shrub. Early Spring.

A bushy shrub or small tree, 3 to 10 feet high or more, with smooth grey bark; the branches of the year clothed with down, intermixed with gland-tipped bristles. Leaves shortly stalked, distichous, $2\frac{1}{2}$ to 4 inches long, slightly unequal at the base, doubly serrate, the secondary veins running straight through the midrib to the margins. Male catkins appearing in autumn, in the axils of the leaves, on the shoots of the year, usually 2 or 3 together in a very short raceme, but not opening until the end of winter or commencement of spring, when they become pendulous and $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long: catkin-scales pale yellow, with purplish tips, downy, wedgeshaped, with 2 smaller floral-scales adnate to their inside: stamens attached to the smaller scales along their line of junction; anthers pale yellow, slightly bearded at the apex. Female flowers from solitary scaly buds resembling the leaf-buds, from which the crimson stigmas are protruded. Leaves rather dull green, paler beneath, finely pubescent, pilose on the petiole and veins beneath. Nuts 2 or 3 together, $\frac{5}{8}$ to $\frac{3}{4}$ inch long, greenish until nearly ripe, at last brown, with a large basal scar.

Hazel.

French, *Coudrier noisetier*. German, *Gemeine Hasel*.

The varieties of the hazel under cultivation are numerous, but are represented by the cobnut and filbert. The name filbert was formerly spelt *filberd* and *fylberde*, and is said to have been so called after a King Philibert, or it is more probably a corruption of *full-beard*, alluding to the husk; but the old English poet Gower assigns to the name a more poetical origin:—

“Phillis

Was shape into a nutte tree,
That all men it might see;
And after Phillis, Philiberd
This tree was classed.”

The name *Avellana* is said by Pliny, according to Professor Targioni, to have derived from Abellina in Asia, supposed to be the valley of Damascus, its native country. He adds, that it had been brought into Greece from Pontus, hence it was called *Nux Pontica*. The nuts were called by Theophrastus, Heracleotic nuts, from Heraclea, now Ponderachi, on the Asiatic shores of the Black Sea. Others admit that a variety of hazel-nut or filbert was brought from Pontus to Abella, a town in Campania, and hence the name *Avellana* was applied to these trees. In France, at the present day, the best varieties are called *Avelines*. But the above indications of an Eastern origin can only refer to particular kinds, for the species, it is well known, is common enough in Italy, as well as other parts of Europe. It is also found over a great part of Asia in a wild indigenous state. It bears the common names of hazel, hazle, or

hasel, not only in this country, but in Germany, Holland, Sweden, and Denmark. The hazel or *Nux Avellana*, we are told by Virgil in the "Georgics," was considered by the Romans to be injurious to the vines, on account of its spreading roots, as the goat was for its propensity to browse on the young shoots; and the keepers of the vineyards used to sacrifice the goat to Bacchus, and roast its entrails on hazel-spits. Virgil also mentions that they used hazel-twigs to bind their vines. In the dark ages the hazel was highly valued for its supposed divining powers. The following passage from Evelyn shows the popular belief in his time on the subject:—"Lastly, for riding switches and divinating rods, for the detecting and finding out of minerals (at least if that tradition be no imposture), it is very wonderful, by whatever occult virtue the forked stick (so cut and skilfully held) becomes impregnated with those invisible steams and exhalations, as, by its spontaneous bending from a horizontal posture, to discover not only mines and subterraneous treasure, and springs of water, but criminals guilty of murder, &c., made out so solemnly, and the effects thereof, by the attestation of magistrates, and divers other learned and credible persons (who have critically examined matters of fact), is certainly next to a miracle, and requires strong faith. Let the curious, therefore, consult the philosophical treatise of Dr. Vallemont, which will at least entertain them with a world of surprising things." The belief that certain gifted persons possessed the power of discovering hidden water or gold by means of a divining-rod is as old as the time of the Romans. When a hazel-rod was used for this purpose, it was peeled, and then laid on the palm of the hand, with the butt end of the twig on the pulse of the wrist, and the diviner moved slowly along, till the rod pointed to the desired place; the diviner feeling at the same time either a violent acceleration or retardation of pulse, and a sudden sensation of heat or cold. Sir Walter Scott makes Dousterswivel in the "Antiquary" use a hazel-twigg as a divining rod; and several instances are mentioned, in different volumes of the "Gentleman's Magazine," of divining rods having been used in England as late as the beginning of the eighteenth century. Numerous other virtues were anciently attributed to hazel-rods. The ashes of the shells of its nuts, applied to the back of a child's head, were supposed to turn the child's eyes from grey to black, and Parkinson says, "Some doe hold that these nuts, and not wallnuts with figs and rue, was Mithridates' medicine effectuell against poysons. The oyle of the nuts is effectuell for the same purposes." He also says, that "if a snake be stroke with an hasell wand, it doth sooner stunne it, than with any other strike; because it is so pliant, that it will winde closer about it; so that being deprived of their motion, they must needs dye with paine and want; and it is no hard matter, in like manner, saith Tragus, to kill a mad dog that shall be strook with an hazel sticke, such as men use to walke or ride withall." Evelyn says, that "the venerable and sacred fabric of Glastonbury, founded by Joseph of Arimathea, is storied to have been first composed of a few hazel-rods interwoven about a few stakes driven into the ground." The hazel has been cultivated for its fruit since the time of the Romans, who, according to Sir William Temple, called Scotland Caledonia, from Cal Dun, the hill of hazel. It is the badge of the Highland clan Colquhoun. It is largely cultivated in Kent, and from thence the nuts are sent all over England. To those who are addicted to indulgence in Kentish cobs or filberts we commend Dr. Culpepper's quaint and amusing vindication of them against the charge of causing indigestion, and difficulty of breathing in consequence. He says, "Why should the vulgar so familiarly affirm that eating nuts causeth shortness of breath, than which nothing is falsier. For how can that which strengthens the lungs cause shortness of breath? I confess the opinion is far older than I am. I knew tradition was a friend of errors before, but

never that he was the father of slanders ; or are men's tongues so given to slandering one another, that they must slander nuts too, to keep their tongues in use ? If anything of the hazel-nut be stopping, 'tis the husks and shells, and nobody is so mad to eat them, unless physically, and the red skin which covers the kernel, which you may easily pull off. And thus I have made an apology for nuts, which cannot speak for themselves."

In its wild state the hazel affords protection and food to many little wild animals and birds. The squirrel and dormouse feed on the nuts with avidity. The nut-hatch, a bird not larger than the sparrow, belonging to the tribe *Scansores*, carries them off singly, and fixes them in the crevice of an oak or some other rough-barked tree, taking his position above, and head downwards, hammers away with his strong beak until he has made an irregular angular hole. Many nuts are made utterly worthless by a beautiful little beetle (*Balaninus nucum*) which in early summer lays within the tender shell of a nut a single egg, which when the kernel is approaching maturity, is hatched into a small grub. This, when the period of transformation to the pupa state is approaching, cuts its way through the shell, and falling to the ground, buries itself, and constructs a cell, from which it comes forth in the following season as a perfect insect. As a timber tree, the wood of the hazel is never of sufficient size for building purposes, but it is used for cabinet-making and in small and delicate productions. It is tender, pliant, of a whitish-red colour, and of a close, even, and full grain ; but it does not take a very bright polish. The roots, when they are of sufficient size, afford curiously veined pieces, which are used in veneering cabinets, &c. The great use of the hazel, however, is for undergrowth. Being extremely tough and flexible, the root-shoots are used for making crates, hurdles, hoops, wattles, walking-sticks, fishing-rods, whip handles, and for withs and bands for general purposes. A strong fence is made by driving stakes into the ground, and interlacing them with hazel-rods. Evelyn tells us that outhouses and even cottages were sometimes made in this manner. Hazel-rods varnished form an admirable material for rustic garden-seats and flower-baskets. Fagots of hazel are in great demand for heating ovens ; and the charcoal, which is very light, is considered excellent for gunpowder ; it is also used for making crayons for drawing, being for that purpose charred in closed iron tubes. As an ornamental tree, when trained to a single stem, the hazel forms a very handsome object for a lawn or park. It is a pleasing and early herald of the ring's approach, the yellowish green catkins presenting perhaps the earliest symptoms of vegetable expansion. The fruit-bearing buds do not show themselves till later, when they burst, and disclosing the bright crimson of their shafts, look extremely beautiful. It not only retains its leaves a long time in autumn, after they have assumed a rich yellow colour, but as soon as they drop they discover the nearly fully grown male catkins, which often come into full flower at the end of October, and remain on the tree in that state throughout the winter, and in days of bright sunshine in February and March, when slightly moved by the wind, they have a gay and most enlivening appearance. Sir Thomas D. Lauder says, "The hazel, besides making up a prominent part of many a grove in the happiest manner, and tufting and fringing the sides of many a ravine, often presents us with very picturesque stems and ramifications. Then, when we think of the lovely scenes into which the careless steps of our youth have been led in search of its nuts, when autumn had begun to brown the points of their clusters, we are bound to it by threads of the most delightful associations, with those beloved ones who were the companions of such idle but happy days." The poetical allusions to the hazel are very frequent. Virgil mentions it, and the old troubadours and French romance-writers have scarcely a

song that does not allude to the hazel-bush or hazel-nut. Our own poets, too, have been lavish on the same theme. Cowley mentions that the hazel is the favourite resort of the squirrel:—

“ Upon whose nutty top
A squirrel sits, and wants no other shade
Than what by his own spreading tail is made.
He culls the soundest, dext'rously picks out
The kernels sweet, and throws the shells about.”

Thomson, in his “Spring,” describes birds as building

“ Among the roots
Of hazel pendent o'er the plaintive stream.”

And in his “Autumn,” the lover searching for the “clustering nuts” for his fair one, and when he finds them—

“ Amid the sweet shade,
And where they burnish on the topmost bough,
With active vigour crushes down the tree,
Or shakes them ripe from the resigning husk,
A glossy shower, and of an ardent brown.”

Gray, in his “Shepherd's Week,” alludes to the magic powers supposed to be possessed by hazel-nuts—

“ Two hazel nuts I threw into the flame,
And to each nut I gave a sweetheart's name,
This with the loudest bounce me sore amazed,
That with a flame of brightest colour blazed:
As blazed the nut, so may thy passion grow,
For 'twas thy nut that did so brightly glow.”

From the custom of burning nuts in this manner on All Hallows' Eve, that day, the 31st October, has received, in some parts of the country, the vulgar appellation of “Nutcack Night.” Burns mentions this custom in his “Halloween”—

“ Among the bonny winding banks,
Where Doon runs wimpling clear,
Where Bruce ance ruled the martial ranks
An' shook the Carrick spear,
Some merry, friendly, contree folks
Together did convene,
To burn their nuts, e'en pou their stocks,
And haud their Halloween
Fu' blythe that night.”

Wordsworth says—

“ Among the woods
And o'er the pathless rocks I found my way,
Until at length I came to one dear nook
Unvisited, where not a broken bough
Drooped with its withered leaves, ungracious sign
Of devastation! But the hazels rose

Tall and erect, with milk-white clusters hung,
 A virgin scene ! A little while I stood,
 Breathing with such suppression of the heart
 As joy delights in ; and with wise restraint
 Voluptuous, fearless of a rival, eyed
 The banquet. Then up I arose,
 And dragg'd to earth each branch and bough with crash
 And merciless ravage ; and the shady nook
 Of hazels, and the green and mossy bower,
 Deformed and sullied, patiently gave up
 Their quiet being ; but, unless I now
 Confound my present feelings with the past,
 Even then, when from the bower I turn'd away
 Exulting, rich beyond the wealth of kings,
 I felt a sense of pain when I beheld
 The silent trees, and the intruding sky."

GENUS V.—CARPINUS. Linn.

Male flowers in cylindrical catkins with rather large persistent catkin-scales: floral-scales or perianth none: stamens 12 or more, inserted on the base of the catkin-scale. Female flowers in lax racemes, in the axils of small caducous bracts, each flower surrounded by a bell-shaped 3-lobed involucre, which is smooth on the outside, but unequally 3-lobed at the apex: perianth completely adherent to the ovary, and not produced beyond it, the limb very short and denticulate: ovary 2-celled, with 1 ovule in each; styles 2, united at the base. Nut ovate-ovoid, compressed, ribbed, solitary, 1-celled and 1-seeded, embraced by a foliaceous cupule with 3 reticulated segments, of which the middle one is much larger than the others; pericarp woody. Cotyledons filling the seed, fleshy.

Trees with scaly buds and deciduous elliptical leaves intermediate in appearance between those of the common elm and beech, but strongly plicate in the direction of the veins. Flowers monœcious, appearing with the young leaves.

According to some authors, the derivation of the name of this genus of plants is from *car*, wood, and *pix*, the Celtic word for head, from the wood being used to make the yokes of oxen; and, according to others, from the Romans using the wood for making a sort of chariot, which they called *carpentum*, and which the Swedes still call *Karm*. The French name, *Charme*, is evidently from the same origin. The English name, Hornbeam, alludes to the horny texture of the wood, and the German one, of *Hainbuche*, to the use of the wood for making groves in the geometric style of gardening.

SPECIES I.—**CARPINUS BETULUS.** *Lin.*

PLATE MCCXCIII.

*Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXXXII. Fig. 1296.**Billot, Fl. Gall. et Germ. Exsicc. No. 460.*

Cupule deeply 3-lobed; the central lobe twice or thrice as long as the lateral ones, oblong, entire or remotely serrate. Limb of the perianth with short ovate acute teeth.

Var. *α*, *gemma*.

Leaves shortly acuminate. Lobes of the cupule entire.

Var. *β*, *provincialis*. Gay.

Leaves scarcely acuminate. Middle lobe of the cupule with a few large teeth on each side.

In woods and hedges. Rather rare, and probably introduced in all its stations, except those in the south of England. Mr. Baker does not consider it native in Yorkshire, and in Scotland it certainly exists only as a planted tree. In Ireland it is only to be found in plantations. I have met with var. *β* in Hainault Forest, Essex, growing with var. *α*.

England, [Scotland, Ireland]. Tree. Spring, early Summer.

A small tree with very smooth dull lead-coloured bark. Leaves subdistichous, 2 to 3 inches long, oval or elliptical-oval, subcordate or rounded at the base, generally acute or shortly acuminate, doubly serrate, with the veins running straight from the midrib to the margin, plicate, especially when young. Male flowers appearing with the young leaves, from buds formed in the axils of the leaves on the wood of the previous year; bud-scales lanceolate, the inner ones strapshaped. Male catkins pendulous, 1 to 1½ inch long: catkin-scales simple, deltoid-ovate, acuminate or subcuspidate, very concave: stamens attached to the base of the scales; anthers pale yellow, strongly bearded at the apex. Female flowers appearing after the male, and terminating the young shoot of the year. Fruit racemes pendulous, 2 to 4 inches long or more; the middle lobe of the cupule at length 1 to 1½ inch long, the lateral lobes much shorter. Nuts about ¼ inch long, greenish-olive, shaped like a small chestnut, with 3 to 11 prominent longitudinal ribs, crowned by the 3 to 8 minute teeth of the perianth. The leaves are rather deep green, paler below, glabrous when mature, pilose when young, and also on the veins beneath when old: they bear some resemblance to those of the beech, but they are narrower, and conspicuously and very sharply doubly serrate, and the bud-scales are

shorter: the leaves have a still greater resemblance to those of the common elm, but they are more plicate, much more sharply doubly serrate, smoother, and thinner in texture. The bud-scales are considerably longer than those of the elm, but shorter than in the beech.

Hornbeam.

French, *Charme commun.* German, *Gemeine Hain* or *Weissbuche.*

The hornbeam, according to Sir E. Smith, is a "a rigid tree of humble growth," but one which, "when standing by itself, and allowed to take its natural form, will make a much handsomer tree than most people are aware of." It is very seldom allowed to become a timber-tree, and is so patient of the knife that it forms excellent hedges, and the few old trunks that remain are generally pollards. It grows freely in our woods and thickets, and forms a principal part of large tracts of woodland in Essex, in the forests of Epping and Hainault. The old writers of Greece and Rome knew this tree, but say little about it; they supposed it to be a kind of maple. Some old English writers consider it to be a kind of elm. Gerard calls it *Betulus sive Carpinus*, and says that "it growes great, and very like unto the elme or wich hasell tree; having a great body, the wood or timber whereof is better for arrowes and shafts, pulleyes for mills, and such like devices, than elme or wich hasell: for in time it waxeth so hard that the toughness and hardness of it may be rather compared to horn than unto wood, and therefore it was called hornebeam or hard beam. The leaves of it are like the elme, saving that they be tenderer: among these hang certain triangled things, upon which are found knaps, or little buds of the bignesses of criches, in which is contained the fruit or seed. The root is strong and thicke." The wood is so tough and white that it is valuable for making various implements, and at one time was especially sought for to make the yokes of cattle; also for mill-cogs, for which, according to Evelyn, "it excels either yew or crab."

As fuel, the wood of the hornbeam may be placed in the highest rank; it burns like a candle, and gives out abundance of heat. Its charcoal is highly esteemed, both for fuel and in the making of gunpowder. According to Linnaeus, the inner bark is used for dyeing yellow. The leaves, when dried in the sun, are used in France as fodder. Marshall says, "The real excellency of the hornbeam lies in its fitness for screw fences for sheltering gardens, nurseries, and young plantations from the severities of the winter season. It may be trained to almost any height, and, by keeping it trimmed on the sides, it becomes thick of branchlets, and consequently of leaves; which, being by their nature retained on the plant after they wither, a hornbeam hedge occasions a degree of shelter nearly equal to that given by a brick wall." Evelyn recommends it to be planted in deer-parks, as he says that deer will not touch it, and will not even rub their young horns against it.

SUB-ORDER II.—BETULINÆ.

Leaves alternate, simple, pinnately veined; stipules deciduous. Flowers monœcious, both the male and female flowers in catkins; catkin-scales of the male catkins accompanied by 2 or more floral-scales, and covering 3 flowers, each flower in some cases with 4 floral scales forming a 4-partite perianth (?): stamens usually 4. Female flowers

in conelike catkins with entire or 3-lobed catkin-scales covering 2 or 3 flowers which have no evident perianth, but are either naked or with 2 floral scales: ovary sessile, 2-celled, with 2 suspended ovules and 2 filiform stigmas, or styles which are stigmatiferous throughout. Fruit a small dry indehiscent 1-celled and 1-seeded nut, or more rarely a 2-celled and 2-seeded nut, with or without a membranous wing or a spongy border.

GENUS VI.—**ALNUS**. *Tournef.*

Male flowers in cylindrical catkins with peltate catkin-scales, to the margins of which minute floral-scales are adnate, each catkin-scale covering 3 flowers; floral-scales combined into a 4-partite perianth (?) round each flower: stamens 4, with short distinct filaments; anthers 2-celled. Female catkins ovoid or ovoid-cylindrical, with fleshy broadly-ovate catkin-scales, each covering 2 flowers; floral-scales 2 to each flower, adnate to the catkin-scale at the base, and not combined into an evident perianth: ovary sessile, 2-celled, with 1 ovule in each cell; styles 2, elongate, filiform, stigmatiferous throughout. Fruit catkins with large persistent woody catkin-scales, each catkin-scale with the 4 axillary floral-scales united with it and much increased in size. Fruit a minute nut, commonly 1-celled and 1-seeded by abortion of the second cell, compressed, angular, with or without a marginal wing. Cotyledons filling the cavity of the seed, flattish, roundish-cordate.

Trees or shrubs with roundish or oval serrate or lobed deciduous leaves. Catkins arranged in short racemes. Male catkins produced in autumn, and remaining naked during winter; female catkins appearing with or shortly after the leaves.

The derivation of the name of this genus of plants is said to be from the Celtic words, *al*, near, and *lan*, the edge of a river, in reference to its habitat; or from the Hebrew *alon*, an oak. Dr. Mayne gives it as from *Alatus annie*, it grows or is nourished by a river or stream.

SPECIES I.—**ALNUS GLUTINOSA**. *Gürt.*

PLATE MCCXCIV.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXXXI. Fig. 1295.

Billot, Fl. Gall. et Germ. Exsicc. No. 447.

Betula Alnus, *Linn.* *Sm.* Engl. Bot. No. 1508.

Leaves suborbicular or roundish-obovate, usually wedgeshaped at the base, retuse or emarginate, faintly lobed or repand and irregularly serrate-denticulate, glutinous when young, hairy on the nerves and in

the axils of the veins beneath. Nut lenticular, bordered, but without a membranous wing.

Var. α , *genuina*.

Leaves slightly lobed or repand and irregularly dentate-serrate.

Var. β , *incisa*.

Leaves deeply cut.

By the sides of streams and ponds, and in damp woods. Common, and generally distributed. Var. β in Wigtonshire (Dr. Balfour) and Black Mountain, near Belfast (Mr. S. A. Stewart).

England, Scotland, Ireland. Tree. Spring.

A small tree, or often merely a bush, but occasionally reaching a height of 50 to 60 feet, with olive-grey bark, rather rough on old trunks, but smooth on the spreading branches. Leaves rather shortly stalked, 2 to 4 inches long; the lateral veins few, running straight from the midrib to the margin. Stipules ovate, deciduous. Male catkins appearing in autumn in racemes opposite the terminal leaf of the shoot, with the peduncles and pedicels rough with glutinous elevations; catkins at length pendulous, 2 to 4 inches long; catkin-scales roundish, dull red, glutinous when young: anthers yellowish. Female catkins appearing after the male, but before the latter open, truly terminal, in racemes like the male; stigmas red. Catkins in fruit becoming cone-like, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, with dark brown woody scales. Nut $\frac{1}{10}$ inch long, pale brown. Leaves shining deep green, paler beneath, slightly plicate.

Common Alder.

French, *Aulne glutineux*. German, *Gemeine Erle*. Eller.

The alder grows in the most swampy wet situations, where but few other trees will thrive. It is found throughout Europe, in Asia, Africa, and also in North America. According to Virgil, the alder formed the first material for boat-building, and Lucan recommends it for that purpose. At the present day it is extensively used in Flanders and Holland for forming piles of bridges and dykes; for the wood, though soft, is of great durability in water. Mitchell observes that woodmen have nearly the same adage for alder poles when peeled for rafters as those of the midland counties have for willows and poplars:—

“Thatch me well, and keep me dry,
Heart of oak I will defy.”

“Stakes of alder,” he says, “will not stand twelve months, nor will the timber do for posts or anything else, when it is in contact with the ground, except under water;” and he recommends it as linings for stone carts and wheelbarrows that are in constant use, “because, being soft, though it may bruise, it does not split by the stones being tumbled in.” Wood of alder which has lain for a long time in peat bogs becomes as black as ebony, and this process prevents its liability to destruction from the ravages of a small beetle

which infests the timber. Large quantities of alder timber are consumed in making herring-barrels, and some by the turner and carpenter, but it is inferior for their purposes to many of our native woods. The bark on the young wood is powerfully astringent, and is employed by tanners, and the young shoots are used both for tanning and dyeing red, brown, and yellow, and, in combination with copperas, to dye black. The catkins dye green, and the female catkins are used by fishermen to sustain their nets above water instead of cork. In "Hall's Travels in Scotland," the author says that the country people in the Highlands make their own shoes, and, to avoid the tax on leather, privately tan the hides with the bark of birch and alder. The fresh wood dyes a snuff colour, and the bark, dried and powdered and mixed with logwood, bismuth, &c., yields the colour called *bone de Paris*. It is said that the Laplanders masticate the bark, and with the saliva so coloured stain their leather garments red. In France the small roots are split and worked into baskets, and the knotty parts of the larger roots are used for inlaying cabinet-work. The leaves are used in medicine as detersive, and a decoction of them as a gargle for diseases of the throat. Pennant mentions that at one time the boughs were spread over the fields in the summer, leaving them there during the winter to rot, and in the following March the undecayed parts were cleared off, and the ground ploughed for a crop of corn. He also writes of strewing "the leaves and young shoots on the floors of houses to attract fleas, which are said to be entangled in the tenacious liquor as birds are by birdlime."

Mr. Loudon tells us that the chief use of the alder is as coppice-wood, to be cut down every five or six years, and made into charcoal for the gunpowder manufacturers. As an ornamental tree much cannot be said in favour of the alder. Du Hamel observes that no cattle will ever touch the leaves of the alder as long as they can get anything else to eat. It is a good tree for parks, and also for hedges; and he adds that it will form very good avenues in situations exposed to cattle. Gilpin says, "He who would see the alder in perfection must follow the banks of the Mole in Surrey through the sweet vales of Dorking and Mickleham into the groves of Esher. The Mole, indeed, is far from being a beautiful river; it is a quiet and sluggish stream; but what beauty it has it owes greatly to the alder, which everywhere fringes its meadows, and in many places forms very pleasing scenes, especially in the vale between Box Hill and the high grounds of Norbury Park." Sir T. D. Lauder says, "The alder is always associated in our minds with river scenery, both of that tranquil description most frequently to be met with in the vales of England, and with that of a wilder and more stirring cast, which is to be found among the glens and deep ravines of Scotland."

Homer, Virgil, and other poets of antiquity mention the alder. In the "Odyssey" we read:—

"In living rills a gushing fountain broke;
Around it and above for evergreen
The bushy alders form'd a shady scene."

And again:—

"Where the silver alders, in high arches twined,
Drink the cool stream, and tremble in the wind."

The frequent mention of the alder as forming the earliest boats for man suggests the idea that possibly a hollow alder falling into the stream on the banks of which it grew may have given rise to the first idea of a boat.

Our own poet Spenser mentions the alders on the banks of the Mulla in his "Colin Clout's Come Home Again:"—

“ ‘One day,’ quoth he, ‘I sate, as was my trade,
Under the foot of Mole, that mountain hoar,
Keeping my sheep among the cool shade
Of the green alders on the Mulla’s shore.’ ”

Browne, another old English poet, alludes to the alder not injuring the grass that grows beneath it :—

“ The alder, whose fat shadow nourisheth
Each plant set neere to him, long flourisheth.”

We have already said that the alder is found to attain the *greatest perfection in damp moist lands*, and no tree is so well adapted for upholding the banks of rivers, from the great multiplicity of its roots. It will not even live on a dry chalky soil.

GENUS VII.—**BETULA**. *Tournef.*

Male flowers in cylindrical catkins with peltate catkin-scales, each catkin-scale accompanied by 2 floral-scales, and covering 3 flowers: stamens 4, attached to the catkin-scale; filaments very short, combined at the base; anthers 1-celled. Female catkins oblong-cylindrical, with the catkin-scales 3-lobed at the apex, and covering 3 flowers; floral-scales or perianth none: ovary sessile, 2-celled, with 1 ovule in each cell; styles 2, elongate-filiform, stigmatiferous throughout. Fruit catkins with rather small deciduous scarious catkin-scales, the 2 lateral lobes of each scale spreading. Fruit a minute nut, 2-celled and 2-seeded or 1-celled and 1-seeded by abortion of the middle cell, surrounded by broad membranous marginal wings. Cotyledons filling the cavity of the seed, flattish, oblong.

Trees or shrubs with roundish or rhomboidal or triangular serrate or lobed leaves. Male catkins generally in pairs, produced in autumn, and remaining naked during the winter; female catkins solitary, appearing with or shortly after the leaves.

According to Dr. Mayne, the origin of the name of this genus of plants is from *batuo*, I beat or strike; because of it were formed the fasces borne before the magistrates by the lictors of Rome.

SPECIES I.—**BETULA ALBA**. *Linn.*

PLATES MCCXCV. MCCXCVI.

Leaves conspicuously stalked, deltoid- or rhomboidal-ovate, acute or acuminate, doubly serrated. Catkin-scales of the female catkin 3-lobed, the sinus between the lobes extending less than half-way down. Fruit with a wing broader than the seed-bearing part, which is oval or oval-obovate.

SUB-SPECIES I.—*Betula verrucosa*. Ehrh.

PLATE MCCXCV.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXXVI. Fig. 1288, DCXXV. Fig. 1287, and DCXXVII. Fig. 1289.

Willd. Fl. Gall. et Germ. Exsicc. No. 463.

B. alba, *Koch*, Syn. Fl. Germ. et Helv. ed. ii. p. 760. *Gren. & Godr.* Fl. de Fr. Vol. III. p. 147. *Crep.* Man. Fl. Belg. ed. ii. p. 271.

B. alba, var. *α*, *Hook. & Arn.* Brit. Fl. ed. viii. p. 395.

B. odorata, *Bechst.* and *B. pendula*, *Roth*, and *B. laciniata*, *Wahl.*, *Reich.* Ic. l. c. pp. 2 and 3.

Leaves deltoid-ovate or rhomboidal-ovate, truncate or with an obtuse angle at the base. Catkin-scales of the female catkin with the lateral lobes falcate-spreading.

In woods and copses, &c. Rather common, and generally distributed.

England, Scotland, Ireland. Tree. Late Spring.

A tree attaining the height of 30 or 40 feet or more, with very smooth white bark, marked with transverse brown bands, and at length splitting or detaching itself in flakes, or in old trees becoming fissured longitudinally. Branches numerous, the twigs slender, purple, and often pendulous when young. Leaves 1 to 3 inches long, those on the strong barren shoots deltoid-ovate, truncate or very slightly cordate at the base, those on the flowering turges generally with an obtuse-angled base; all of them sharply doubly serrate, with the lateral veins running nearly straight from the midrib to the margin. Stipules very caducous, 3 times as broad as long. Buds oblong-conical. Male catkins appearing before the winter, at the extremity of the twigs of the year, but not expanding until the young leaves appear in spring, solitary or 2 or 3 together, drooping or pendulous, 1 to 2½ inches long, with reddish catkin-scales: stamens 10 to 12 under each of the peltate catkin scales, which has two thinner and smaller floral scales under it: anthers yellow, sometimes tinged with red. Female catkins solitary, from lateral buds, with 2 or 3 leaves at the base, stalked, cylindrical: catkin-scales green, 3-flowered and 3-lobed: styles purple. Fruit catkins ½ to 1½ inch long, fusiform-cylindrical or oblong, with densely imbricated brown scales, which are wedgeshaped at the base, and 3-lobed at the apex, the central lobe lanceolate, acuminate, the 2 lateral lobes nearly semicircular or lunate-semicircular, and spreading. Fruit reddish-brown, with a very broad pale-brown scarious wing on each side, the wing with a notch at the apex, extending down to the seed-bearing part of the fruit. Leaves usually glabrous, somewhat resinous above, especially when young; young branches, buds, and catkin scales almost always glabrous and resinous.

When the young branches are more pendent than usual, it is the

B. pendula of Roth, and when the leaves are deeply lobed, the *B. laciniata* of Wahlenberg.

White Birch.

French, *Bouleau blanc*. German, *Gemeine Birke*.

This is certainly the most graceful of our forest trees, and occurs abundantly in the woods and thickets of Northern Britain. It thrives best on barren, rocky, and sandy soils, and seems to grow as luxuriantly on the poorest land as on the most fertile. It rises frequently to a height of thirty or forty feet, and in northern climates attains a larger size, becoming often two feet or more in diameter at the base of the trunk. The peculiar bark, very rugged on the lower part of the stem, at least in old trees, but smooth above, and separating in thin papery layers of silver whiteness, distinguish it from all other British trees, while its light small foliage and slender branches render it one of the most elegant of them. The barren catkins are long and slender, the fertile ones short and thicker; both are produced on the same tree.

The birch was known to the Greeks and to the Romans. According to Pliny and Plutarch, the celebrated books which Numa Pompilius composed 700 years before Christ, and which were buried with him on Mount Janiculum, were written on the bark of the birch tree. In the early days of Rome the lictors had their fasces made of birch branches, which they carried before the magistrates to clear the way, beating the people back with the boughs. The birch was formerly used for decorating houses during Rogation week, in the same manner as holly at Christmas. Gerard says, the branches of the birch "serve well to the decking of houses and banquetting rooms for places of pleasure, and beautifying the streets in the Crosse or Gang week, and such like." Phillips tells us that the Cross or Gang week was the same as Rogation week, and so-called from the crowds or gangs of penitents going in that week to confession before Whitsuntide. It was called Cross week from the crosses carried before the priests in the procession on Ascension Day; and Rogation week, from the Latin verb *rogo*, to ask or pray. Coles, writing in 1657, observes that as he "rid through Little Brickhill in Buckinghamshire, every sign poste in the towne was bedecked with green birch." Mr. Loudon tells us that he observed the same custom in Poland at the same season; where also large boughs are fixed in the ground, against each side of the doors of the houses." The birch has been used as an instrument of correction at schools from the earliest ages. "Anciently," says Evelyn, "birch cudgels were used by the lictors, as now the gentler rods by our tyrannical pedagogues for lighter faults." Gerard observes that in his time "schoolmasters and parents do terrifie their children with rods made of birch." The use of these rods, however, has now almost passed away both in schools and families, and it is only in some few of the more ancient institutions which refuse to accept modern enlightenment on many subjects that the birch rod is superseded by the cane for the same purpose. Birch brooms have a reputation still, and the young shoots are extensively used in making besoms of all sorts. In Lapland and Kamtschatka the huts are constructed with birch branches covered with turf, and fagots of the spray with the leaves on, in cases of the reindeer skin, serve for seats during the day, and beds at night.

In the Highlands of Scotland birch may be said to be the universal wood. "The Highlanders make everything of it; they build their houses of birch, make their beds, chairs, tables, dishes, and spoons of it; construct their mills of it; make their carts,

ploughs, harrows, and gates of it; and even manufacture ropes of it. The branches are employed as fuel in the distillation of whiskey, and are found to contribute a pleasant flavour to it. Birch spray is also used for smoking hams and herrings, for which last purpose it is much preferred. The bark is used for tanning leather, dyeing yellow, making ropes, and sometimes, as in Lapland, instead of candles. In tanning, the empyreumatic oil obtained by distillation from the birch is said to give the peculiar scent and durable qualities peculiar to Russia leather. A decoction of the bark is found to preserve nets and cordage immersed in it better than any other preparation. In Russia it is applied to the same purposes for which that of the canoe birch is used in North America, boats being formed of it that are nearly as light and portable as those made by the Red Indians of Canada. So little is the wood of the birch disposed to decay, that in many submerged forests the remains of the birch trees are often discovered with the bark entire, and retaining its white hue, though the wood within has for ages been converted into a carbonaceous mass. In many places where the birch tree grows abundantly, the sap is converted into an agreeable liquid known as birch wine, and we know that in the district of Balmoral in the Highlands of Scotland a certain quantity of this wine is annually prepared very carefully for the royal owner of the estate, who is said to prefer it to more costly beverages. The house belonging to the Prince of Wales at Balmoral, and formerly inhabited by the Queen's physician, is known as Birk or Birch Hall, and is so called on account of the number of birch trees near it.

When the sap rises in the tree in the spring it contains about two per cent. of sugar, and is obtained by incisions into the bark, and the introduction of a pipe, through which it flows into a vessel below. It is then boiled with sugar or honey, and, when bottled, becomes bright and effervescent. That made in Russia sparkles like champagne. The frequent abstraction of the sap of course soon destroys the trees, and many birches were thus killed near Hamburgh in 1814 by the Russian soldiers, who tapped all the trees they could find, and made themselves intoxicated with the fermented juice. From a flourishing tree of moderate size from four to six quarts of sap may be obtained in a single day, and, if the hole be then carefully filled up with resin or some similar substance to stop any further exudation, but little injury will be done to the tree, though its growth is in all cases checked for a time. A variety of the birch is very common in the Highland woods, called the "Drooping Birch," having its branches very slender and pendulous, and justifying, by its peculiarly graceful appearance, Coleridge's epithet of "Lady of the Woods." Birch buds exhale a delicious fragrance after spring showers, as remarked by Sir Walter Scott in one of his happy Highland sketches:—

"The birch trees wept in fragrant showers."

The quantity of oil contained in the birch is considerable, and in Norway the bark is twisted and made into torches. Oil is obtained from the bark by distillation, which is used, as we before noticed, in the tanning of Russian leather, and also in medicine, both internally and externally. Innumerable are the uses to which the wood of the birch, both in its very young and its mature state, are applied. On the Continent many kinds of furniture are made of it. Sabots, cups, and bowls, and many other articles are formed out of it. The buds and catkins afford a kind of wax; the ashes yield potash, and the spray is used for thatching houses, and as a material for sleeping upon.

In landscape gardening the birch is an interesting tree, from its form and the whiteness of its bark, which renders it more conspicuous in winter than in summer. Its

stem, as Gilpin observes, is generally marked with brown, yellow, or silvery touches, which are peculiarly picturesque, as they are characteristic objects of imitation for the pencil, and as they contrast agreeably with the dark green hue of the foliage.

Ancient poets do not appear to have sung the praises of the birch, though it is mentioned by most of the modern poets. Shenstone introduces it in his "Schoolmistress," when alluding to the birchen rods :—

"And all in sight doth raise a birchen tree,
Which Learning near her little dome did stow ;
Whilome a twig of small regard to see,
Though now so wide, its waving branches flow,
And work the simple vassal's mickle love ;
For not a wind might curl the leaves that blew,
But their limbs shuddered, and their pulse beat low,
And as they look'd they found their horror grew,
And shaped it into rods, and tingled at the view."

Phillips says :—

"Even afflictive birch,
Cursed by unlettered youth, distils
A limpid current from her wounded back,
Profuse of nursing sap."

And Leyden :—

"Sweet bird of the meadow, soft be thy rest ;
Thy mother will wake thee at morn from thy nest ;
She has made a soft nest, little redbreast, for thee,
Of the leaves of the birch, and the moss of the tree."

The "birks of Invermay" aspire to the interest of classic ground, and the verses by Burns, in which the following lines occur, are well known :—

"Now simmer blinks on flowery braes,
And o'er the crystal streamlet plays.
Come, let us spend the lightsome days
In the birks of Aberfeldy.
Bonnie lassie, will ye go
To the birks of Aberfeldy ?

While o'er their heads the hazels hing,
The little birdies blythely sing,
Or lightly flit on wanton wing
In the birks of Aberfeldy.
Bonnie lassie, &c.

The braes ascend like lofty wa's,
The foaming stream deep roaring fa's,
O'erhung wi' fragrant spreading shaws,
The birks of Aberfeldy.
Bonnie lassie, &c.

The hoary cliffs are crown'd wi' flowers,
 White o'er the linn the burnie pours,
 And rising, weets wi' misty showers,
 The birks of Aberfeldy.
 Bonnie lassie, &c.

Let fortune's gifts at random flee,
 They ne'er shall draw a wish frae me,
 Supremely blest wi' love and thee,
 In the birks of Aberfeldy.
 Bonnie lassie, &c."

And again:—

"Let fragrant birks, in woodbines drest,
 Thy craggy cliffs adorn,
 And for the little songster's nest
 The close enbow'ring thorn."

Keats describes:—

"The silvery stems
 Of delicate birch trees."

And Professor Wilson gives us a beautiful description of a birch tree in his "Isle of Palms:"—

"On the green slope
 Of a romantic glade we sate us down,
 Amid the fragrance of the yellow broom;
 While o'er our heads the weeping birch tree stream'd
 Its branches, arching like a fountain shower."

SUB-SPECIES II.—**Betula glutinosa.** *Fries.*

PLATE MCCXCVI.

Reich. Ic. Fl. Germ. et Helv. Vol. XII. Tab. DCXXIII. Fig. 1282.

B. pubescens, Ehrh. Koch, Syn. Fl. Germ. et Helv. ed. ii. p. 761. Gren. & Godr. Fl. de Fr. Vol. III. p. 147. Crep. Man. Fl. Belg. ed. ii. p. 271.

B. alba, Reich. Ic. l. c. p. 2.

B. alba, var. β, Hook. & Arn. Brit. Fl. ed. viii. p. 365.

Leaves rhomboidal-ovate or ovate, rounded or having a right or even acute angle at the base, or sometimes subcordate on the barren shoots. Catkin-scales of the female catkin with the lateral lobes ascending.

Var. *α, denudata. Gren. & Godr.*

B. glutinosa, Wallr. Sched. Crit. p. 497.

B. carpatica, "Waldst. & Kit. Willd. Spec. Plant, Vol. IV. p. 464" (Wallroth).

Young branches and leaves glabrous and resinous.

Var. β , *pubescens*.

B. pubescens, Wallr. Sched. Crit. p. 499.

Sterile branches and sometimes the fertile ones, and often the leaves, at least those on the sterile shoots, pubescent.

In woods, thickets, &c. Common, and generally distributed.

England, Scotland, Ireland. Tree or Shrub. Late Spring.

Very similar to *B. verrucosa*, but usually not so tall a tree, often in the Scotch Highlands a mere shrub or even bush not more than 5 or 6 feet high. The principal point of difference lies in the scales of the female catkin, which have the 2 lateral lobes ascending, and all the 3 lobes oval. The leaves are generally more ovate than in *B. verrucosa*, the buds oval-ovoid, the stipules shorter in proportion to their breadth, and there is a tendency in the leaves and young shoots to be more or less pubescent; the leaves are also on shorter stalks, and the twigs are less frequently pendulous.

Common Birch.

French, *Bouleau pubescent*. German, *Weichhaarige Birke*.

This species is distinguished by botanists from the preceding as less elegant, sometimes not more than a bush, with the leaves always more or less ovate, and the catkin-scales ovate and rounded, instead of elongated and tapering. When full-grown, the birch is subject to a curious morbid affection, which causes dense tufts of twigs to grow out every here and there upon the branches, sometimes to the number of fifty or more on a single tree. During the summer these tufts are concealed by the foliage; but in winter, when the tree is leafless, they show conspicuously, and look like obsolete rooks' nests. In Scotland they are termed "witches' knots." That the birch is one of the earliest inhabitants of our island is shown in a very interesting manner, mentioned by Dr. Grindon of Manchester, who says that it is found extensively in the peat-bogs near that city. When the peat is removed during the process of drainage, immense quantities of fragments of branches and twigs are found embedded in the lower strata, with the silvery bark still adhering, and as bright as when it grew, though the age must be 1,500 or 2,000. Besides the fragments of branches at Lindow, there are found great pieces of the main trunks.

SPECIES II.—**BETULA NANA.** *Lin.*

PLATE MCCXCVII.

Reich. Ic. Fl. Germ et Hely. Vol. XII. Tab.

Leaves very shortly stalked or subsessile, suborbicular, obtuse, deeply crenate. Catkin-scales of the female catkin deeply 3-cleft, the sinus between the lobes extending more than half-way down. Fruit with a narrow margin, but without a distinct wing, suborbicular.

In heathy places. Rare, but widely distributed on the higher hills in Scotland.

Scotland. Shrub. Early Summer.

A small shrub, with ascending branches, rarely above 2 or 3 feet high. Leaves $\frac{1}{4}$ to $\frac{1}{2}$ inch long, and generally rather broader, rounded or subcordate at the base, reticulated, dark green. The male catkins I have not seen. The female catkins are shortly stalked, $\frac{1}{4}$ to $\frac{3}{8}$ inch long. Catkin-scales brown, very deeply cleft. Fruit bordered, but not evidently winged. Leaves glabrous, the young shoots pubescent.

Dwarf Birch.

French, *Bouleau nain*. German, *Zwerg Birke*.

This species is little more than a bushy shrub, with many little downy branches. It is a native of Lapland, Sweden, Russia, and Scotland. According to Pallas, it is common in the whole of the north of Russia and Siberia. In wet situations, he says, the shoots grow to the length of six feet, and in a state of cultivation they grow as high as nine feet, and assume an erect form. This shrub is of singular use in the domestic economy of the Laplanders. Its branches furnish them with their beds and their chief fuel; its leaves, with a better yellow dye than that obtained from the common birch; its seed affords nourishment to the ptarmigan or white partridge, which supplies a considerable portion of their food, and also forms an important article of commerce; and for their medicine it produces the fungus *Polyporus fomentarius*, from which the mosa or amadow is prepared, which Laplanders consider an efficacious remedy in all painful diseases. To make this preparation, the outer covering of the fungus is peeled off, and the interior part, which is soft and full of fibres, is boiled in a lye of wood-ashes. It is then dried, and beaten with a hammer till it becomes flat; after which it is again boiled in a solution of saltpetre. In this state it makes excellent tinder, igniting with the slightest spark. It is the *agaric de chêne* or *agaric des chirurgiens* of the French druggists. The Laplanders are said to cure a violent pain in any part of the body by laying a piece of *P. fomentarius* on the part, and igniting it—much after the manner of a mustard plaister, we imagine, by counter-irritation.

SUB-ORDER III.—MYRICEÆ.

Leaves alternate, simple, pinnately veined. Stipules caducous or absent. Flowers diœcious, rarely monœcious, both the male and female flowers in catkins. Catkin-scales of the male catkins often accompanied by 2 lateral floral-scales, and covering 1 flower, which is without an evident perianth: stamens 2 to 6, or very rarely 8. Female catkins with entire scales, each catkin covering 1 flower, which is surrounded by 2 to 6 scales (perianth?), which adhere to the base of the ovary, and increase and become somewhat fleshy after flowering: ovary sessile, 1-celled, with 1 erect ovule, style very short, with 2 long stigmas. Fruit a small dry indehiscent 1-celled and 1-seeded nut, enclosed in the enlarged and more or less fleshy scales, which have resinous or

waxy dots upon them, the fruit thus enclosed forming a false drupe like that of *Hippophae*.

GENUS VIII.—MYRICA. *Linn.*

Flowers diœcious. Male flowers in cylindrical catkins, with ovate concave scarious catkin-scales, each of which covers a single flower: perianth none or reduced to a pair of scales: stamens 2 to 8, inserted on the base of the catkin-scale. Female catkins ovoid-cylindrical with densely imbricated catkin-scales, each covering a single flower: floral-scales 2 to 4, adhering to the lower part of the ovary: ovary 1-celled, 1-ovuled, with a short thick style; stigmas 2, elongated. Fruit a small 1-celled and 1-seeded nut, surrounded by a fleshy covering formed by the enlarged floral-scales which adhere to its lower part, so that it resembles a small drupe. Fruit catkins with the catkin-scales coriaceous and persistent, or deciduous.

Shrubs generally sprinkled with resinous dots and fragrant. Leaves entire or serrate, generally narrowed towards the base. Flowers produced before or with the young leaves.

The name of this genus of plants is derived from *μύρον* (*muron*), sweet ointment, in reference to its fragrance.

SPECIES I.—MYRICA GALE. *Linn.*

PLATE MCCXCVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXX. Fig. 1277.

Leaves oblong-oblanceolate, wedgeshaped, serrated towards the apex only or entire. Flowers opening before the leaves. Male catkins racemose, crowded; female catkins shortly oblong, with imbricated sub-persistent catkin-scales. Nuts in catkins, small, not encrusted with white wax. Leaves deciduous, rather pale green, especially below, not shining.

In bogs and wet heaths and thickets. Local, but widely distributed over England. Frequent on the moors of Scotland, especially in hilly districts, but not reaching as far north as Orkney or Shetland. Frequent throughout Ireland.

England, Scotland, Ireland. Shrub. Spring.

A small bushy shrub, 2 feet high or more. Stems often decumbent and rooting at the base, with numerous ascending twigs; bark purplish-brown, smooth. Leaves very shortly and indistinctly stalked, 1 to 3 inches long, tapering gradually towards the base, acute or obtuse,

usually with a few sharp teeth towards the apex. Male catkins in subdistichous racemes, from buds formed in summer in the axils of the leaves, opening in the succeeding spring before the leaf-buds begin to expand, erect, $\frac{1}{2}$ to $\frac{3}{4}$ inch long: catkin-scales broadly ovate-rhombic, acute, concave, brown with pale margins: anthers reddish; pollen very abundant, pale yellow. Catkins of the female plant formed in summer as in the male plant, but a little later in expanding in the following spring, ovoid, $\frac{1}{4}$ inch long in flower: catkin-scales reddish-brown: styles protruded, crimson. Drupes about the size of rape-seed, in catkins not more than $\frac{1}{4}$ to $\frac{1}{2}$ inch long, greenish yellow, pointed and margined, enclosed at the base in the persistent floral-scales, which are sprinkled with small resinous dots. Leaves rather dull green above, paler and yellower beneath, subglabrous or (as well as the branches of the year) thinly sprinkled with short hairs; young branches and leaves sprinkled with minute dots of yellow fragrant resin.

Bog Myrtle.

French, *Myrica galé*. German, *Gemeiner Gagel*.

This is a low-growing shrub, with small leaves, clothed over with whitish resinous glands, and having a very fragrant odour. It is abundant on the northern moors, and in other parts of the island. It seldom rises more than two feet in height; but forms very close dense tufts, which are the favourite shelter of various birds, and likewise of the viper.

The whole plant is aromatic. The leaves are sometimes used to flavour beer, as an agreeable substitute for hops. They are likewise employed to give a pleasant scent to clothes, and to keep away vermin. In Wales the cottagers lay the branches where they will be obnoxious to fleas, the odour being so hateful to these insects that a witty tourist declares the myrica to be the genuine "traveller's joy." A strong decoction of the tops is given to children to destroy worms, and it is likewise used as a poison for fleas. An infusion of the tops is used for tanning calf-skins, and as a yellow dye. The berries partake of the aromatic qualities of the leaves, and are employed in France as a spice. They are supposed, however, to give a narcotic quality to beer in which they have been infused. By distillation they yield a very fragrant essential oil. Upon the surface of the catkins is a peculiar wax-like secretion, which may be separated by immersing them in boiling water. It possesses all the properties of true wax, and like that obtained from another species, *M. cerifera*, the "Candleberry Myrtle," growing in New Brunswick, may be employed for candle-making. Candles made from the foreign species have been exhibited in the Great Exhibitions of 1851 and 1862. Though the stems of the bog myrtle are too small to be of any other economic value, they furnish good fuel, and were used in Gerard's time by the people of the Isle of Ely to heat their ovens. In Wales, too, it is gathered for fuel, and while burning reminds us of the poet's words,

"Gale from the bogs shall waft Arabian balm."

SUB-ORDER IV.—SALICINEÆ.

Leaves alternate (rarely a few of the opposite), simple, undivided, pinnately or palmately veined. Stipules mostly persistent and herba-

ceous on the later shoots and on the suckers. Flowers diœcious, both the male and female flowers in catkins. Catkin-scales of the male catkins covering 1 flower, with the floral-scales reduced to 1 or 2 glands, or united into a disk or perianth (?): stamens generally 2, but sometimes 3, 4, 5, 12, or more. Female flowers with entire or laciniated catkin-scales, each scale covering 1 flower, which has 2 glands sometimes combined into a cup or perianth at the base: ovary sessile or stalked, 1-celled or imperfectly 2-celled, with numerous ascending ovules; style short, with 2 entire or 2-cleft or 2-partite (rarely 4-cleft) stigmas. Fruit a capsule, opening by 2 valves containing numerous seeds clothed with silky hairs.

GENUS IX.—POPULUS. *Tournef.*

Flowers diœcious. Male catkins cylindrical: catkin-scales irregularly toothed or laciniate at the apex: floral-scales united to form an oblique perianth or cuplike disk: stamens 8 to 30, inserted in the disk; filaments distinct. Female flowers in ovoid or cylindrical catkins: catkin-scales laciniate or nearly entire: floral-scales united to form a cuplike disk, surrounding the base of the ovary: ovary sessile within the disk, 1-celled and many-ovuled; style very short; stigmas elongate, spreading, but so deeply cleft as to appear 4- or 4-cleft, so as to be apparently 8 in number. Fruit catkins elongated, lax, with caducous bracts. Fruit a conical herbaceous capsule, opening by 2 valves, and containing numerous seeds clothed with long silky white down.

Trees, or more rarely shrubs, with the leaves broadly ovate, rhomboidal, roundish or deltoid, often lobed or deeply toothed. Catkins drooping, appearing before the leaves.

The most commonly-given derivation of this word is from *populus*, which, as Dr. Prior says, "we might fancy to have been suggested by the *pap-ap-ap* of the quivering leaves." There is, however, he states, a resemblance between the leaves of the species of *populus* and that of the Indian *Picus religiosa*, the name of which is *pepul*, "a name which we can scarcely doubt is not an accidental coincidence of sound with *populus*, but identical with it in its origin, and brought westward into Europe by the early Asiatic colonists, and carried eastward into India in connection, perhaps, with some religious observance."

SECTION I.—LEUCE. *Duby.*

Catkins dense in fruit, their scales ciliated with long hairs. Stamens usually 8 (4 to 12). Stigma with 4 to 8 slender segments, which are linear, or slightly enlarged at the apex. Young branches pubescent, hairy or cottony.

SPECIES I.—**POPULUS ALBA.** *Linn.*

PLATES MCCXCIX. MCCC.

Young barren branches densely felted, hoary. Buds all downy, not viscous; flower-buds ovoid; leaf-buds ovoid-conical. Leaves roundish-deltoid or rhombic-orbicular, angulated or lobed, cottony white or greyish-white beneath, at least when young; those of the suckers ovate or roundish-deltoid, coarsely toothed or lobed, cordate at the base, permanently white or grey and cottony beneath. Male catkins cylindrical; female catkins oblong while in flower. Catkin-scales ciliated, those of the male catkins laciniate, of the female crenate or more or less deeply toothed or sublaciniate.

SUB-SPECIES I.—**Populus eu-alba.**

PLATE MCCXCIX.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXIV. Fig. 1270.

P. alba, Auct. Plur.

P. alba, var. α, Bromf. in Fl. Vect., p. 460.

Young branches and buds densely cottony and white. Leaves of the suckers or young plants deltoid-ovate, with large lobes, at first flocculent-pubescent above, afterwards glabrous, always densely cottony and pure white beneath; leaves of the flowering shoots roundish deltoid, angulated and sinuate-dentate, permanently pure white beneath. Scales of the female catkins "crenate at the apex" (*Koch*). "Stigmas bipartite, yellow" (*Arn.*).

In most woods and meadows, and beside rivers. Rather scarce, but generally distributed in England, though doubtfully native. According to Dr. Graham, it does not flower about Edinburgh, so that there is no probability of its being native in Scotland. In Ireland it occurs only where planted.

England, [Scotland, Ireland.] Tree. Spring.

A large tree sending up numerous suckers. Bark rather smooth, grey. Branches spreading. Leaves on the young shoots 2 to 4 inches long, with triangular lobes, those on the flowering shoots and spurs smaller and rounder, less white beneath, and said to be sometimes glabrous beneath when old. Male catkins pendulous, 3 inches long, with brown scarious laciniate scales, ciliated with long white hairs. The fertile catkins I have not seen.

White Poplar.

French, *Peuplier blanc*. German, *Silber Pappel*, *Weisspappel*.

The named species of the genus *populus*, like those of most cultivated plants, are very numerous. There is, however, little doubt that the white poplar is a good species, and that it is now a native of Great Britain, although it is stated to have been originally brought to this country from Flanders. The true *Populus alba*, as well as the grey poplar (*P. canescens*), is found throughout the south of Europe, Caucasus, Persia, and Barbary. We have no early notices of this tree. Turner, who wrote in 1568, says that "the white aspe is plentiful in Italy and Germany;" but he does not seem to have met with it in England. But Gerard, who wrote thirty years after Turner, mentions having seen it at Blackwall and at Fenden, and other places. Whether the white poplar be a true native of England or not, there is no doubt that it was early cultivated in Flanders, the soil of which country seems to suit it, and sent over to England. Hartlib, in his "Complete Husbandman," published in 1659, mentions, that some years before he wrote, "10,000 aheles were sent over from Flanders to England, and transplanted in my English country." The Dutch consider it a very valuable tree, and Evelyn says they "look upon a plantation as an ample portion for a daughter." The word *abele* given to the tree in England, comes from the low Dutch *abeel*, significant of its hoary and aged character.

The white poplar was known to the Greeks and Romans. It is the λευκή (*leuke*) of Theophrastus and Dioscorides. It is often referred to by Virgil in the "Eclogues" and "Georgics," and also by Horace and Pliny. It was sacred to Hercules, and his devotees crowned themselves with its branches and leaves at their sacrifices. A legend says that Hercules destroyed Cacus in a cavern adjoining mount Aventinus, which was covered with white poplars, and in the moment of his triumph he bound his brows with a branch from one of these trees. It is also recorded that when Hercules returned from the infernal regions, he wore a wreath of white poplar on his head. The ancient believers in this fable thus account for the white colour of the under surface of the leaves of the poplar, this having been produced by the perspiration of the hero, whilst the thick smoke of the infernal regions turned the upper part of the leaves black. Homer in his "Iliad" compares the fall of Simoisius, when killed by Ajax, to that of a poplar:—

"So falls a poplar that in watery ground
Raised high its head with stately branches crowned."

Ovid says that Paris had carved the name of Cœnone on a poplar. Virgil, in the "Georgics," gives directions for cultivating the white poplar. Cowper speaks of

"The poplar that with silver lines his leaf,"

And Barry Cornwall says—

"The green woods moved, and the light poplar shook
Its silver pyramid of leaves."

In his "Sentimental Journey," Sterne paints Maria as sitting under a poplar.

All the species of poplar are remarkable for their white and tough wood, which accounts for the old distich written on a plank of poplar—

"Though heart of oak be e'er so stout
Keep me dry, and I'll see him out."

These lines also allude to the fact that poplar wood does not endure when exposed to moisture or water. The wood of the poplar contains a considerable quantity of moisture. Loudon says that "white poplar weighs, when green, 58 lbs. 3 oz. per cubic foot, and in a dried state, 38 lbs. 7 oz." The wood of the abele is very white, and it is used where whiteness and lightness are essential. It is also readily stained by dyeing materials. It does not readily warp, and is a good material for wooden buildings on farms, and for barn-doors. The cooper also employs it for wooden dishes and casks. In Sweden the leaves are eaten by cattle. For ornamental planting, it needs to be placed where large masses of foliage are picturesque. Individual plants, by their great size, injure by comparison the effect of all surrounding objects. There is one property it possesses which recommends it in treeless districts, and that is, the rapid way in which it grows. Withering says, that it withstands better than any other tree the prevalence of north-east winds. In the fifth volume of the "Philosophical Transactions" is a paper by the Rev. W. Stone, in which he says that poplar bark is an efficacious remedy for ague. It contains a principle which is called *populine*, and which, like the analogous principle in the willows called *salicine*, is probably the cause of its beneficial action in disease. The bark also contains tannic acid in sufficient quantities to have been used in tanning leather.

Throughout Great Britain and Ireland noble specimens of this tree are to be found. Some at Longleat are said to be 100 feet in height, with trunks from three to four feet in diameter, and with forty to sixty feet of clear bole. On the banks of the Thames, between Hampton Court and Chertsey, are several specimens upwards of 100 feet high. Loudon, in his "Arboretum," gives a list of trees in this country and on the Continent, of great height, and of comparatively young age.

The white poplar is easily propagated by means of layers or truncheons. The latter need not be inserted very deeply, because the roots they send forth always originate in those parts of the truncheon nearest the surface. All authorities agree that in cultivation this species bears lopping worse than any other.

SUB-SPECIES II.—*Populus canescens*. Sm.

PLATE MCCC.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXV. Fig. 1271, and DCXVI. Fig. 1272.
"P. hybrida, M. B. and P. Bachofenii, Wierzbicki." *Reich. Ic. l. c. p. 29.*

P. alba, var. β , *Bromf. Fl. Vect. p. 460.*

Young branches and buds thinly cottony, and grey. Leaves of the suckers deltoid-ovate, subcordate, toothed, but not distinctly angulated or lobed, at first flocculent pubescent above, afterwards glabrous, always cottony and greyish-white beneath; leaves of the flowering shoots suborbicular or rhombic-orbicular, sinuate-dentate, white beneath when young, at length glabrous on both sides. Scales of the female catkins sharply toothed or sublaciniate at the apex. Stigmas 2- to 4-partite, purplish crimson.

In moist woods, meadows, &c. Rather rare, but widely distributed over England, and truly wild in the south and east. Not recorded from Scotland or Ireland even as a naturalised plant.

England. Tree. Spring.

A tall tree, with the bark at first smooth and grey, but at length deeply fissured and rugged. Flowering branches nodose, with brownish bark; the stems of the suckers and barren shoots clothed with grey pubescence. Buds brown, rather thinly covered with grey hairs. Leaves of the suckers with the petiole shorter than the lamina; the latter 2 to 4 inches long, ovate or deltoid-ovate, cordate, coarsely toothed, but the teeth seldom projecting into distinct lobes, the under-side permanently clothed with greyish-white felted hairs. Leaves of old trees (at least those of the flowering spurs) with the petiole as long as or longer than the lamina, which is suborbicular or sometimes transverse, coarsely sinuate-toothed and at length commonly glabrous on both sides, but sometimes remaining grey beneath: in the former case the leaves closely resemble those of *P. tremula*. Catkins appearing before the leaves from buds on the last year's wood, sessile. Male catkins pendulous, 2 to 4 inches long, with brown scarious lacinate catkin-scales ciliated with long white hairs: stamens commonly 8, but varying from 6 to 10. Female catkins 1 to 2 inches long when in flower, elongating to 3 or 4 inches in fruit: stigmas varying, even on the same catkin, from 4 to 8, on account of each of the two being 2-, 3-, or 4-partite. Capsules shortly stalked, $\frac{1}{4}$ inch long, lanceolate-ovoid. Seed-hairs pure white.

Grey Poplar.

French, *Peuplier grisâtre*. German, *Graue Pappel*.

This species is constantly confounded with the White Poplar, or Abele; it is, however, distinguished by certain characters, which have popularly given to it the name of the Grey Poplar. These distinctions are so permanent, that the botanist has no hesitation in recognising the one as distinct from the other. Whilst *Populus alba* has a right to the name Abele, *P. canescens* is called Grey, or Common White Poplar. The great distinction between the two species is that *P. alba* has the down on the under surface of its leaves decidedly white, whilst *P. canescens* has a greyish down, and is sometimes deficient of down underneath altogether. The two species are constantly seen growing together, and then may be easily distinguished. The Grey Poplar is said to be of much slower growth than the Abele, and the wood is on that account much firmer. For all purposes where strength and durability are required the wood of the grey poplar is preferred. On account of this superiority, this species has been extensively cultivated in certain parts of England. It is very abundant in Norfolk, where it was brought into notice by the late Mr. Crowe, who was well known as having studied this genus and the allied one of *Salix*. The wood of this species is as white as any of the species, and is used in France and Germany for many purposes where lightness of weight and colour are desirable. It forms excellent packing-cases, because nails may be driven into it without splitting. It is used by the turner and cabinet-maker, and a great many toys and small articles are made of it. The boards and rollers around which pieces of silk are wrapped in shops and warehouses, are made of this wood expressly for its lightness. In Britain the wood is extensively

employed for boarding floors. In Scotland it is sometimes used in mill-work and by the cabinet-makers and turners; and for making wooden dishes and casks. The leaves are eaten by cattle in Sweden, and are considered wholesome. As an ornamental tree, the grey poplar is chiefly to be recommended in scenery on a large scale, since its great height and ample head overpower most artificial objects, such as buildings, and most exotic trees, from their comparative slowness of growth. Mr. Loudon recommends as the fittest tree to plant with this poplar, other rapid-growing poplars and willows; and says the fittest situations are the margins of broad rivers, or that of a large lake. Mr. Winch informs us that the grey poplar and its varieties are remarkable for withstanding the north-east winds, so detrimental to vegetation on the coast of Northumberland and Durham.

SPECIES II.—*POPULUS TREMULA*. Linn.

PLATE MCCC.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXVII. Fig. 1273 and DCXVIII. Fig. 1274.

Billot, Fl. Gall. et Germ. Exsicc. No. 2742.

Young barren branches pubescent, not felted or hoary. Buds all glabrous, shining, slightly viscous; flower-buds ovoid; leaf-buds conical, very acute. Leaves suborbicular, sinuate-serrate or dentate-serrate, glabrous or silky grey when young, at length glabrous, those of the suckers ovate, cordate or subcordate, serrate or dentate-serrate, permanently hairy on the veins beneath or sometimes all over the lower surface. Male and female catkins cylindrical while in flower. Catkin-scales in both sexes deeply lacinate.

Var. *α*, *villosa*.

P. villosa, *Lange, Reich. Fl. Germ. Excurs.* p. 173.

P. canescens, *Reich. Ic. l. c.* p. 30. (non *Sm.*).

Young leaves densely silky, those of the suckers and barren shoots often permanently pubescent beneath.

Var. *β*, *glabra*.

Young leaves glabrous and ciliated, or subglabrous.

By the banks of streams, and in woods and rocky places. Rather common, and universally distributed. In the absence of specimens with young leaves, I am unable to define the distribution of the two varieties. Var. *α* is common about Claygate, Surrey, and appears to be the most frequent form in England. I have var. *β* from Orphir, Orkney; near Bonar Bridge, Sutherland; and Glen Callater, Braemar.

England, Scotland, Ireland. Tree or shrub. Spring.

Var. α is a tree usually of moderate size, though sometimes attaining a great height, with smooth grey bark; suckers numerous; the leaves 2 to 6 inches long, exceeding the petiole, with much stiffer hairs on the underside than in *P. canescens*. Mature leaves on long much compressed petioles; lamina 1 to 2 inches long by 1 to 3 inches broad, much resembling that of *P. canescens*, but more regularly and less deeply sinuate-serrate, the teeth curving inwards and rounded off at the apex. The young leaves have a few hairs above, but are quite silky and white beneath; they at length become quite glabrous on both sides. Female catkins longer and with more deeply lacinate scales than in *P. canescens*. Segments of the stigma shorter and thicker, generally 4, rarely 6 or 8. Fruit considerably smaller and narrower. Leaf-buds more pointed and with scarcely any hairs except at the margins of the scales.

Var. β , at least the specimens of it I have seen, is a bush 3 to 12 feet high, with the leaves smaller, somewhat inclining to rhombic, and the teeth usually curving less forward, often so little as to be rather dentate than serrate, though this varies much in both forms.

Aspen.

French, *Peuplier tremble*. German, *Zitterpappel*.

The origin of the popular name, Aspen, is thus given by Dr. Prior: "In Chaucer *aspe*, the adjective form of which we have adopted as the name of the tree: Anglo-Saxon, *aepse*, and German *aspe*, words that seem to represent the sibilant sound of its ever-moving leaves, as in *asp*, Greek *ἀσπίς*, a serpent, from its hissing; *whisper*, *wasp*, and *sibilo*. Skinner would derive it from the Greek *ἀσπαιρω*, palpitare, but the word is much older in the north than the study of Greek." The peculiar trembling movement of the leaves of the aspen has given rise to much speculation, and various traditions. It is accounted for by mechanical facts, and the flattened petiole of the leaves allows the slightest motion of the atmosphere to affect the leaf, so that—

"When zephyrs wake,
The aspen's trembling leaves must shake,"

and, by their friction on one another, make a constant rustling sound. This trembling is constantly the subject of poetical allusions. In Scotland there is a superstition that the cross of Christ was made from the wood of this tree, and that consequently it never ceases to tremble, as a consequence of the terrible event in which its species became involved. A recent writer observes that this can hardly apply to the leaves, as the cross could not have been made of them; but perhaps, she adds, "they struggle to escape from the wicked wood on which they grow." Gerard says, "It is the matter whereof women's tongues were made (as poets and others report), which seldome cease wagging." This sentiment is surely somewhat malicious.

In its natural state, the trembling poplar forms the chief food of beavers, where the animal abounds; and deer, goats, and other creatures, are fonder of the spray and buds than those of any other tree. The wood is white and tender, and is employed by turners, by sculptors, and engravers. The bark is used in tanning, in common with that of the other species. As fuel, it is inferior, and gives but little heat. Its charcoal is light and soft, and is used in making gunpowder. The leaves,

either green or dried, are employed in France, Germany, and Sweden, as food for cattle, and this Bose thinks one of the most valuable purposes of the tree. The powdered bark, given in doses of half a pound, expels the bots and worms from the stomach of horses; and in Russia, Pallas informs us, the bark is used in domestic medicine. In the Highlands of Scotland, the bark is made into torches.

The phrase, to "tremble like an aspen leaf," has become a household word, and is as old as the poet Spenser, who says—

"His hand did quake
And tremble like a leaf of aspen green,"

And Sir Walter Scott's well-known lines remind us of this tree—

O woman! in our hours of ease,
Uncertain, coy, and hard to please,
And variable as the shade
By the light quivering aspen made;
When pain or sickness rends the brow,
A ministering angel thou."

SECTION II.—AIGEIROS. *Duby.*

Catkins lax in fruit, their scales not ciliated. Stamens 8 to 20. Stigma with 4 short thick and often wedgeshaped segments. Young branches glabrous, often shining and glutinous.

SPECIES III.—**POPULUS NIGRA.** *Linn.*

PLATE MCCCII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXIX. Fig. 1275.

Branches spreading; young branches glabrous, not distinctly angular. Buds all glabrous or subglabrous, shining, viscous; flower-buds oblong acuminate with the point curving outwards; leaf-buds conical, acute. Leaves all deltoid or ovate-deltoid, acuminate or cuspidate, finely crenate-serrate, glabrous, ciliated when young, and often with a few scattered hairs on the veins, quite glabrous when old. Male catkins cylindrical. Female catkins fusiform, lax in fruit. Catkin-scales shortly laciniate. Capsules globular-ovoid.

By the banks of rivers and in damp woods. Rather scarce, and probably not native, except in the south of England.

England, Scotland, Ireland. Tree. Spring.

A large tree with yellowish-grey bark and spreading branches; the young ones yellowish, uneven, but not raised into sharp angles. Leaves $1\frac{1}{2}$ to 5 inches long, on long compressed petioles. Male catkins pendulous, 2 to 3 inches long: stamens 12 to 20; anthers red. Female catkins shortly stalked, ascending and 1 to $1\frac{1}{2}$ inch long in flower,

drooping and 4 to 6 inches long in fruit: stigmas very thick, uneven, spreading-reflexed. Capsules roundish-ovoid, distant, stalked. The scales of the buds are yellowish, shining, and viscous, but the outer scales of the flower-buds are sometimes faintly pubescent, at other times quite glabrous, like those of the leaf-buds. The branches, petioles, and even the lamina of the leaves, have at first a few hairs on them, but very soon become quite glabrous.

Black Poplar.

French, *Peuplier noir*. German, *Schwarzpappel*.

Till about the beginning of the present century, the black poplar was most extensively introduced into British plantations, but recently it has been superseded by other varieties. The wood of this species is applicable to all the uses of the white poplar. Its most general use on the Continent is for packing-cases, more especially for wine-cases. The wood is yellow, soft, and fibrous, and splits more readily than the wood of other species. It never splinters, and, according to Evelyn, is incomparable for making trays, bowls, and other turners' ware. It is used for making clogs, and for the soles, as well as the heels, of shoes. It is employed by the cartwright, and Vitruvius reckons it among the building timbers. Planted thick, and cut down for rafters, poles, and rails, few trees make a quicker return. It forms but indifferent fuel, being in this respect greatly inferior to birch. In Russia the bark is used for preparing morocco leather, and when pulverised it is eaten by sheep. In Britain it is consumed like the oak for tanning leather. The bark of the old trunk being very thick, light, and corky, is used by fishermen to support their nets, and, it is said, is also substituted for cork in bottles. The buds, macerated in boiling water, and afterwards bruised in a mortar and pressed, yield a fat substance which burns like wax, and exhales a fine odour. The balsamic sap with which the buds are covered, forms the basis of what Gerard calls "that profitable ointment unguentum populeum, which is used as a soothing remedy against nervous diseases and hemeroides." He also says, "The leaves and young buds do assuage the paine of the gout in the hands or feet, being made into an ointment with May butter. It is good against all inflammations, bruises, squats, falls, and such like."

The young shoots of the black poplar may be used as a substitute for those of the willow in basket-making. The cottony substance which surrounds the seeds has been used in Germany and France as wadding, and it has also been manufactured into cloth hats and paper; but the expense of collecting it, and the want of length and elasticity in the fibre prevented the success of the experiment.

There is an old fable related by Ovid, that when Phaeton, by his heedless driving of the chariot of the Sun, set half the world on fire, he was hurled therefrom by Jupiter into the Po, where he was drowned, and his sisters, the Heliades, wandering on the banks of the river, were changed into trees, but the poets do not agree as to whether they were poplars or alders. The evidence in favour of the poplar consists in there being abundance of black poplars on the banks of the Po; in the poplar, in common with other aquatic trees, being so surcharged with moisture as to have it exude through the pores of the leaves, which may be literally said to weep; and in there being no trees on which the sun shines more brightly than on the black poplar, thus still showing gleams of parental affection to the only memorial left of the unhappy son whom his fondness had contributed to destroy.

Spenser says—

“And eke those trees in whose transformed hue
The Sun's sad daughters wailed the rash decay
Of Phaeton, whose limbs, with lightnings rent,
They gathering up, with sweet tears did lament.”

The quivering of the leaves of the black poplar, and the manner in which the sun dances on their smooth surfaces, have suggested to poets images of activity and beauty. Homer, in speaking of Penelope's handmaids, says—

“Some ply the loom, their busy fingers move
Like poplar leaves, when zephyr fans the grove.”

And a Spanish poet writes—

“Each wind that breathes gallantly here and there,
Waves the fine gold of her disordered hair,
As a green poplar leaf in wanton play
Dances for joy at rosy break of day.”

The black poplar is famous among naturalists for producing a sort of gall, or protuberance of various shapes and sizes, on its leaves and branches, which have usually been mistaken for the lodgments of worms hatched from the eggs of an ichneumon fly; but they are in reality produced from the operations of a viviparous species of *Aphis*, for the bringing up of its offspring. These galls are of the bladder kind, being usually skinned over, and more or less hollow within, not woody, as those of the oak.

GENUS X.—*SALIX*. *Tournef.*

Male catkins ovoid or cylindrical: catkin-scales entire; floral-scales (*nectary*) 2, distinct or rarely united so as to form a very minute cuplike disk—or 1 on the inner side of the stamens: stamens usually 2, but varying from that to 8, the 2 stamens with the filaments sometimes so completely united as to appear but 1. Female catkins oblong or cylindrical: catkin-scales entire: (*nectary*) as in the male flower, of 2 floral-scales distinct or rarely united, or of 1 on the inner side of the stalk of the ovary: disk or perianth none: ovary usually stalked, 1-celled, many-ovuled; styles short or elongate; stigmas usually short, 2, entire or notched or 2-cleft. Fruit catkin usually elongated, dense or lax, with the catkin-scales deciduous or caducous. Fruit a conical herbaceous or dry capsule, opening by 2 valves, and containing numerous seeds clothed with long silky white hairs.

Shrubs or trees with the leaves usually much longer than broad, entire or serrate. Catkins appearing before or with the leaves, erect, or more rarely drooping.*

* In the arrangement of the British willows, I have closely followed that adopted in the sixth edition of Professor Babington's "Manual of British Botany." His

According to Dr. Mayne, the name of this genus is derived from *salio*, to spring out, from its rapid growth; other authors say it comes from the Celtic *sal*, near, and *lis*, water, in reference to its general habitat.

SECTION I.—VITISALIX. *Dumort.*

Catkin and its leafy stalk deciduous together, lateral, appearing with the leaves. Catkin-scales of a uniform pale yellow colour. Nectary of 2 pieces or "urceolate." Stamens or pistils between the 2 pieces of the nectary. Vernation convolute.

SUB-SECTION I.—LYCUS. *Dumort.*

Nectary "undivided" or 2-cleft, 1 portion being between the catkin-scale and the germen or stamen, the other between these organs and the rachis of the catkin.* Stamens 4 to 8 (or 12?).

Large shrubs or small trees with glossy glabrous leaves. Stipules caducous or rudimentary.

division of the genus is that of M. Dumortier; a detailed account of which will be found in Seeman's "Journal of Botany," for June, 1863, p. 167, and in the "Bulletins de la Société Royale Botanique de Belgique," vol. i. p. 140.

With regard to the so-called species and varieties, I have made but slight changes from the nomenclature now commonly recognised in this country, avoiding the minute subdivisions proposed by Sir J. E. Smith and Mr. Borrer on the one hand, and the extreme reduction of the number of species adopted by Mr. Bentham on the other, though possibly each of these may be right in the main, when the subject is viewed from each of the two extreme significations of the term "species." I have derived great assistance from Dr. Wimmer's "*Salices Europææ*," and the admirable "*Monographia Salicum*" of Mr. Andersson, but although I strongly incline to the conclusion arrived at by these writers, namely, that a great number of the forms are hybrids, I have not ventured to use the hybrid nomenclature until this question shall have been satisfactorily settled. The great abundance of these so-called hybrid forms, and the fact that some of them shade imperceptibly into one of the supposed parents but not into the other, are the two chief points which may be urged against the supposition of their hybrid origin; for there is no genus in which *à priori* one might more reasonably expect to find crosses than in *Salix*, where we have dioecious plants, several species often growing together, much visited by insects, and having flowers.

* The character given by M. Dumortier of the nectary is that it is urceolate and undivided. I have found it of 2 pieces in the specimens of *S. pentandra* and *S. cuspidata* which I have examined.

SPECIES I.—**SALIX PENTANDRA.** *Linn.*

PLATE MCCCIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXII. Fig. 1268, and DCXIII. Fig. 1269.

Billot. Fl. Gall. et Germ. Exsicc. No. 1065.

Wimm. Sal. Europ. p. 22. *Anders.* Mon. Sal. p. 35.

S. pentandra and *S. polyandra*, *De Bray.* *Reich.* Ic. l.c. p. 29.

Leaves oval or elliptical or oblanceolate-oval, acuminate, finely and closely glandular-serrate, shining, glabrous on both sides; petiole with numerous glands at the apex. Stipules oblong, obtuse, rarely present, except in the form of a minute gland. Catkins opening after the leaf buds expand, on short leafy lateral branches, spreading or slightly drooping, dense, obtuse. Catkin-scales oblong, obtuse, pubescent at the base, glabrous at the apex. Stamens 4 to 8 or 12 (?), but generally 5; filaments hairy at the base. Capsule conical-subulate, green, glabrous, on a stalk twice as long as the nectary; style short; stigmas thick, 2-lobed, spreading. Young branches and young leaves glabrous.

In wet places, and by the banks of rivers. Rather scarce, but generally distributed, though most common in the north of England and Lowlands of Scotland. Whether it is indigenous in the south of England and north of Scotland seems doubtful. Local and rather rare in Ireland, but native in the north of the island.

England, Scotland, Ireland. Shrub or Tree. Summer.

Usually a shrub 3 to 10 feet high, but, under favourable circumstances, developing into a moderately large tree, with brown bark, and spreading-erect branches, the young ones reddish-brown or reddish-yellow, tough, but separating readily at the point whence they originate. Leaves, when full grown, 2 to 4 inches long by $\frac{3}{4}$ to 2 inches broad, the broadest part usually a little above the middle; the base rounded; the apex generally greatly acuminate, at length coriaceous, smooth above, the under side paler, with the veins conspicuous. Male catkins 1 to 2 inches long, at first erect, ultimately pendulous. Catkin-scales pale yellow, concolorous. Female catkins a little shorter than the male, but on longer stalks and with more numerous leaves, their catkin-scales narrower. Nectary with the front portion frequently but slightly developed, but the nectary seems inconstant, as Dumortier and Babington describe it as entire and undivided. Capsule about $\frac{1}{4}$ inch long. Young leaves and branches glutinous, fragrant.

Bay-leaved Willow.

French, *Saule à cinq étamines.* German, *Fünfnährige Weide.*

The varieties of willow are so numerous in this country, and the species are so much alike in general utility and appearance, that it is difficult to distinguish between them, and we therefore design to say something of the history of the genus, and specially to notice the particular uses of any species as it follows in order. The ancients wrote of willows, and Pliny recognised the willow as among the most useful of aquatic trees, furnishing props for vines, and the bark being used for tying up the shoots, and the young branches for basket-making.

The enormous number of species described by botanists in recent times is most confusing. In 1829 the Duke of Bedford had printed for private circulation the *Salicium Woburnense*, in which 160 species are figured and described, for the most part all then alive in the salicium at Woburn. Lightfoot, in his "Flora Scotica," paid great attention to willows; but, according to Sir J. E. Smith, "he laboured at the subject with hesitation and mistrust, from an opinion of the species being confounded by cross-impregnation."

In an economical point of view, but little was added to our knowledge of the culture and uses of the willow, since the time of the Romans, till the slight notices of the uses of willows by Ray, and afterwards by Evelyn. Willows for basket-making and hoops were chiefly imported from the Continent till the commencement of the present century, when our exclusion from that locality by war led to the formation of plantations at home.

The principal plantations of willows for basket-making in every country are made along the banks of rivers and streams, and in England those on the Thames and the Cam are the most celebrated. In both these rivers and in some others small islands are frequently planted entirely with willows, and are called osier holts. There are many such islands in the Thames between London and Reading. The willow is frequently cultivated as a pollard, the lop being valuable for fence wood, poles, hurdles, and fuel. In the time of Cato a crop of willows was considered so valuable that he ranks the salicium as next in value to the vineyard and the garden. In a state of nature, the willow furnishes food by its leaves to the larvæ of moths, gnats, and other insects, and by its flowers to bees. Its wood also is preferred to most others by the beaver. The leaves and young shoots are considered good food for cattle, and in some countries are dried and stacked for the purpose. In a rude state of civilisation the twigs of the willow were used in constructing houses, household utensils, panniers, the harness of horses and cattle, and various other purposes connected with boating and fishing. Dr. Walker relates that he has ridden in the Hebrides with a bridle made of twisted willow twigs, and lain all night at anchor with a cable made of the same material.

The present species is one of the latest flowering willows, the flower seldom expanding till the beginning of June. The flowers are remarkably fragrant, as are the leaves, especially when bruised. The fragrance, which is similar to that of the sweet bay, *Laurus nobilis*, only less powerful, is exuded from the resinous notches of the leaves, and from the barren catkins. It is one of the most desirable species for planting in pleasure-grounds, and is the handsomest of the shrubby English willows, the large and abundant yellow catkins contrasting most agreeably with the copious and shining foliage, which has the look of some fine evergreen rather than that of a plant that annually sheds its leaves. It grows well from cuttings, and will make

itself at home in the dry soil of town gardens. Mr. Forbes states that when cut down this species produces tough flexible rods, fit for basket-work; but in a wild state on the banks of Gogar Burn, where its five or six other sorts were periodically cut down for basket-work and for hoops, the shoots of this species were considered short and brittle, as compared with those of the others. There is a moth which inhabits this willow known as the Gothic moth, which is much esteemed by collectors on account of its rarity. Notwithstanding this it was seen in 1826 in Cheshire, in immense quantities during a thunderstorm.

SPECIES (?) II.—**SALIX CUSPIDATA.** *Schultz.*

PLATES MCCCIV. MCCCIV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCXI. Fig. 1266.

Anders. Mon. Sal. p. 37. Borrer in E. B. S. Nos. 2961 and 2962.

S. pentandra-fragilis, Wimm. Sal. Europ. p. 134.

S. Meyeriana, Wild. Reich. Ic. l.c. p. 28.

Leaves oblong-oval or oblong-elliptical, longly acuminate, finely and closely glandular-serrate, shining, glabrous on both sides; petiole with a few glands at the apex. Stipules half-cordate, oblique, frequently present. Catkins opening a little after the leaves, on short leafy lateral branches, spreading, dense, obtuse. Catkin-scales oblong, obtuse, pubescent all over or more rarely subglabrous at the apex. Stamens 3 to 5; filaments hairy at the base. Capsule subulate, swollen at the base, glabrous, on a stalk 3 or 4 times as long as the nectary; style short; stigmas thick, notched, spreading. Young branches and young leaves glabrous.

Found at Hanwood, near Shrewsbury, by Rev. W. A. Leighton, and subsequently near Pountsbury, Shropshire, by the Rev. L. Darwell, but doubtfully native.

England. Tree. Early Summer.

There can be very little doubt of this being a hybrid between *Salix pentandra* and *S. fragilis*. From *S. pentandra* it differs in having the leaves drawn out into a longer and more slender acumen, and thinner in texture, the catkins produced earlier, the rachis of the catkins more hairy, the catkin-scales generally clothed all over with short hairs, the stamens more often only 3 or 4, the catkins on longer stalks, narrower, and more attenuated at the apex. It also often attains a greater height.

From *S. fragilis* it differs in the leaves being shorter and broader, more rounded at the base, and much more acuminate at the apex, brighter green above, and not glaucous beneath, more finely glandular-serrate at the margin, and on petioles glandular at the apex. The catkins are produced later, and the stamens are generally more than 2.

The branches are not brittle, though they separate readily at their origin.

Pointed-leaved Willow.

French, *Saule à cinq étamines*. German, *Zugespitzte Weide*.

SUB-SECTION II.—AMERINA. *Drem.*

Nectary generally of 2 pieces (at least in the male flowers), 1 between the catkin-scale and the germen or stamens, the other opposite to the first (in the female flowers often of 1 piece only, between the germen and the rachis). Stamens 2, rarely 3 to 6.

Trees or large shrubs with the leaves at length usually glabrous and subcoriaceous.

GROUP I.—DIANDRÆ.

Catkin-scales soon falling. Stamens 2.

SPECIES III.—**SALIX FRAGILIS.** *Linn.*

PLATES MCCCVI. MCCCVII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCIX. Fig. 1264.

Billot, Fl. Gall. et Germ. Exsicc. No. 1955.

Winm. Sal. Europ. p. 19. *Anders.* Mon. Sal. p. 41.

Twigs ascending, readily breaking off at their origin. Leaves narrowly lanceolate-elliptical or elliptical (or, when young, oblanceolate-elliptical), attenuated at the base, longly acuminate, glandular-serrate, shining above, glabrous on both sides when mature. Stipules half-cordate, deciduous, often absent. Catkins opening at the same time as the leaf-buds expand, on short leafy lateral branches, spreading or recurved, cylindrical, thick, rather dense in flower, but lax in fruit. Catkin-scales strapshaped-lanceolate, subobtusely, pilose, especially towards the base. Stamens 2, rarely 3 to 5; filaments hairy at the base. Capsule conical-subulate, glabrous, on a stalk twice or thrice as long as the nectary; style short; stigmas short, divaricate, deeply notched. Young branches and young leaves sometimes silky.

ENGLISH BOTANY.

Var. α , *genuina*.

PLATE MCCCVI.

S. fragilis, *Sm.* Engl. Bot. No. 1807, and Engl. Fl. Vol. IV. p. 184. *Hook.* Brit. Fl. ed. iv.* p. 358. *Lindl.* Syn. Brit. Fl. p. 232.

Branches brown, very smooth, those of the year olive or olive-orange. Leaves lanceolate-elliptical. Style shorter than the stigmas.

Var. β , *decipiens*.

PLATE MCCCVII.

S. decipiens, *Hoffm.* *Sm.* Engl. Bot. No. 1936, and Engl. Fl. Vol. IV. p. 183. *Hook.* Brit. Fl. ed. iv. p. 358. *Lindl.* Syn. Brit. Fl. p. 232.

Branches dull-yellow, highly polished; young twigs often orange-red or crimson. Leaves elliptical, or those of the lower branches oblanceolate-elliptical, smaller than those of var. α . "Style longer than the stigmas." (*Sm.*)

By the banks of rivers and in meadows and moist hedges and osier grounds. Common, and generally distributed, but no doubt often planted. Absent from the north of Scotland, and doubtfully native in Ireland. Var. β apparently less common, and perhaps always planted.

England, Scotland, Ireland. Tree. Late Spring, and early Summer.

A large bushy-headed tree, with the branches set on at a considerable angle, and the young ones very readily breaking off at the base when struck, especially in spring. Leaves when full-grown 4 to 5 inches long, by about 1 inch broad, with very short petioles. Stipules leafy on the late shoots. Male catkins when expanded $1\frac{1}{2}$ to 2 inches long by about $\frac{1}{2}$ inch in diameter: anthers bright yellow. Female catkins on longer stalks, much more erect, and more lax than in the male, in fruit often very lax; in flower $1\frac{1}{2}$ to 2 inches long, in fruit sometimes 3 inches or more. Nectary generally of two pieces, both in the male and female flowers, but the outer piece much smaller in the female than in the male. Capsule $\frac{1}{4}$ inch long, greenish olive. Leaves shining green above, rather paler and frequently pruinose-glaucous beneath, glabrous but sometimes sparingly clothed with adpressed silky hairs when young.

Var. β is described as being a smaller tree, with much more polished

* I quote the fourth edition of the "British Flora," as it gives a complete view of Mr. Borrer's opinions on the willows at the date of its publication (1837).

bark. Only the male plant of it is now known in this country, although Smith describes the female. It is not improbable that it only appears when *S. fragilis* has its shoots cut annually for osiers.

Var. α , *Crack Willow*. Var. β , *White Welsh Willow*.

French, *Saule fragile*. German, *Bruch Weide*.

This tree is tall and bushy-headed, growing from eighty to ninety feet high. The branches are round and very smooth, and "so brittle at the base in spring, that with the slightest blow they start from the trunk. Hence the name of "crack willow," though, according to Sir J. E. Smith, this is more or less the case with other willows, both native and exotic. It is also known as the "red wood willow," or "stag's head osier." The heart wood is of a deep red colour, very tough, and not as soft as that of most trees of the genus. It is very durable, both under water and when exposed to the air, and makes good fences, posts, and handles for implements of husbandry. When seasoned well it may be used in building houses, for planks, &c., and will last well. Many medical properties were formerly attributed to this tree, which is generally distinguished, *par excellence*, as "the willow." The roots of the tree are used in Sweden to boil with eggs to make them of a purple colour at Easter time. Gilpin writes, "The withy, or *Salix fragilis*, is of little value in landscape, and yet there is something beautiful in its silver catkins, which open, as the year advances, into elegant hanging tufts, and when the tree is large and in full bloom, make a beautiful variety among the early productions of the spring." The bark of *S. fragilis* and its varieties contains a large quantity of tannin, and is probably little inferior to that of the oak. The bark sold by druggists for medical purposes is collected indiscriminately from this and other species.

The variety β has highly polished and reddish brown branches, the young shoots being sometimes almost crimson.

SPECIES (?) IV.—**SALIX VIRIDIS.** *Fries.*

PLATE MCCCVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCX. Fig. 1265 (?)

Anders. Mon. Sal. p. 43.

S. fragilis-alba, *Wimm.* Mon. Sal. p. 133.

S. Russelliana, *Sm.* Engl. Bot. ed. i. No. 1808, Engl. Fl. Vol. IV. p. 186. *Hook.*

Brit. Fl. ed. iv. p. 358. *Lindl.* Syn. Brit. Fl. p. 232.

S. alba, var. *viridis*, *Wahl.* Fl. Suec. ed. ii. p. 658. *Anders.*

S. fragilis, var. *Russelliana*, *Hook. & Arn.* Brit. Fl. ed. viii. p. 401. *Bab. Man.* Brit.

Bot. ed. vi. p. 308.

Twigs erect, not breaking off readily at their origin. Leaves narrowly lanceolate-elliptical, attenuated at the base, longly acuminate at the apex or equally attenuated at each end, glandular-serrate, shining above, glabrous on both sides when mature. Stipules half-ovate, deciduous, often absent. Catkins opening at the same time as the leaf-buds expand, on short leafy lateral branches, spreading or recurved, cylindrical, rather slender, rather dense in flower, but lax in fruit.

Bedford Willow.

This valuable tree, known also as *S. Russelliana*, was first brought into notice by Francis, Duke of Bedford, about the beginning of the present century. It is thought to be a variety of *S. fragilis*, and bears the family name of the Bedfords. A celebrated tree of this species grew at Litchfield, which was said to have been planted by Dr. Johnson; but in the "Gentleman's Magazine" for 1785 (seven months after Johnson's death), there is a particular account of this tree, wherein it is stated that it had been generally supposed to have been planted by Dr. Johnson's father, but that the Doctor never would admit the fact. It appears, however, to have been a favourite tree of the Doctor's, and to have attracted his attention for many years; indeed, to use his own expression, it was the "delight of his early and waning life," and it is said he never failed to visit it whenever he went to Litchfield. In November 1781, he requested Dr. Trevor Jones, a physician of that place, to prepare a detailed account of the tree for preservation in the "Philosophical Transactions," which he did. At that time the tree was computed to be fourscore years old, and some good authorities inclined to think that a century had passed over its head. The tree stood near the public footpath in the fields between the City of Litchfield and Stow Hill, the residence of the celebrated "Molly Ashton," and it is said that Dr. Johnson frequently rested under its shade on his way to the house of that lady, whom he never failed to visit periodically till within a short time of his death. Dr. Withering tells us that he paid a visit

to the far-famed willow, and says, "The magnitude of this tree is surprising, especially when the general character of its congeners is considered. The trunk at six feet above the ground measures twenty-one feet in girth, and extends twenty feet in height of that vast size before dividing into enormous ramifications. The whole trunk, thus comprising about 130 feet of solid timber, continues perfectly sound, and the very extensive head shows unimpaired vigour. A younger plant (though a full-sized tree) in the adjoining meadow promises to sustain the reputation of its sire." In the November of the same year of Dr. Withering's visit, 1810, many of the branches were swept away by a violent storm, and nearly half of what remained of the tree fell to the ground in August, 1815, leaving little more than its stupendous trunk and a few side boughs. In 1825 a fire was made by some boys in the hollow of the trunk, which would probably have consumed it, had not Mr. Stringer, whose garden nearly adjoins it, seen the flames, and sent off to the town for the fire-engines. In April, 1829, the tree was blown down in a violent storm, which took place on the 29th of the month, about three o'clock in the afternoon. After this event, the proprietor of the ground on which the tree stood, regretting that there was no young tree to plant in its stead, recollected that a branch had been blown off the tree before, and used for pea-sticks in his garden. Examining them, he found that one had taken root, and he had it at once removed, and planted on the site of the old tree in fresh soil, giving a dinner on the occasion to his friends and the admirers of Johnson. The timber of *S. Russelliana* or *S. viridis*, as it is called in our present work, is the most valuable of any of the willow tribe.

The Babylonian or weeping willow belongs to this group of willows, and is peculiarly the poet's willow. It is asserted that the poet Pope first introduced it into England, and planted it in his garden at Twickenham. The story is, that Pope, happening to be with Lady Suffolk when she received a present from Spain, or, according to some, from Turkey, observing that some of the pieces bound round it appeared as though they would vegetate, took them up, saying, "Perhaps these may produce something we have not in England." Whereupon he planted one which became the celebrated weeping willow of the Twickenham garden. Other authors say that the tree was brought to Europe by Tournefort. It is now universally cultivated, and almost naturalised in England. The weeping willow is the emblem of grief, and is employed in many countries as such in cemeteries and near mausoleums, frequently taking the place of the cypress with this object. It conveys rather the idea of grief with hope for the future, than the thick heavy foliage of the cypress, which inspires only gloomy thought. The willow which grew over the grave of Napoleon Buonaparte in St. Helena was one of this species, and many hundred cuttings from this identical tree are now distributed throughout Europe.

This Eastern willow is doubtless the one to which frequent reference is made in the sacred writings. The Psalmist writes, "By the waters of Babylon we sat down and wept when we remembered thee, O Sion! As for our harps, we hanged them upon the willow trees that are therein." The legendary origin of the weeping willow, according to the Arabian story, is as follows:—After David had married Bathsheba, he was one day playing on his harp in his private chamber, when two strangers entered unseen by any one. They were angels, who made him convict himself of his crime, and convinced him of his great guilt. For forty days and nights he lay mourning and weeping on the ground, and shedding bitter tears of repentance. As many tears of repentance as the whole human race have shed, and will shed, on account of their sins, from the time of David to the Judgment Day, so many did David weep in those forty days, all the while moaning forth psalms of penitence. But the tears from his

eyes formed two streams, which ran from his chamber into the garden. Where they sank into the ground there sprung up the trees, the weeping willow and the frankincense tree. The first weeps and mourns, the second is incessantly shedding big tears in remembrance of David's repentance."

Among British poets the willow of any species is considered to be the emblem of despairing love, and to 'wear the willow' is significant of sorrow and forsaken loneliness.

"In love the sad forsaken wight
The willow garland weareth."

Desdemona's song suggests this idea:—

"The poor soul sat sighing by a sycamore tree.
Sing, all a green willow!
Her hand on her bosom, her head on her knee.
Sing, willow! willow! willow!
The fresh streams ran by her, and murmured her moans,
The salt tears ran from her, and softened the stones.
Sing, willow! willow! willow!
Sing all a green willow must be my garland."

Herrick says:—

"A willow garland thou didst send,
Perfumed, last day to me,
Which did but only this portend,
I was forsook by thee.
Since so it is, I'll tell thee what,
To-morrow thou shalt see
Me wear the willow, after that
To die upon the tree."

The death of poor Ophelia, as described by the Queen in "Hamlet," refers to the willow:—

"There is a willow grows ascaunt the brook,
That shows his hoar leaves in the glassy stream.
Therewith fantastic garlands did she make
Of crow flowers, nettles, daisies, and long purples,
That liberal shepherds give a grosser name.
There on the pendent boughs her coronet weeds
Clambering to hang, an envious sliver broke,
When down her weedy trophies and herself
Fell in the weeping brook."

The willow is the badge of the Highland clan Cumming.

SPECIES V.—**SALIX ALBA.** "*Linn.*" *Koch.*

PLATES MCCCIX. MCCCX. MCCCXI.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCVIII. Fig. 1263.

Billot, Fl. Gall. et Germ. Exsicc. No. 847.

Twigs erect, not breaking off readily at their origin. Leaves narrowly elliptical, nearly equally attenuated at each end, finely

callous-serrate, more or less silky pubescent on both sides, rarely glabrous when mature. Stipules linear-lanceolate or ovate, very caducous, often absent. Catkins opening at the same time as the leaf-buds expand, on short leafy lateral branches, spreading, cylindrical, rather thin, lax, especially in fruit. Catkin-scales strapshaped, subacute, more or less pilose towards the base, glabrous and ciliated towards the apex. Stamens 2; filaments hairy in the lower half. Capsule ovate-oblong, glabrous, on a stalk scarcely longer than the nectary; style scarcely any; stigmas rather long, divaricate, notched. Young branches and young leaves almost always silky-pubescent with white hairs.

Var. α , *genuina*.

PLATE MCCCIX.

S. alba, *Sm.* Engl. Bot. ed. i. No. 2430.

S. alba, var. α , *Sm.* Engl. Fl. Vol. IV. p. 231. *Hook. & Arn.* Brit. Fl. ed. viii. p. 401. *Hook.* Brit. Fl. ed. iv. p. 359.

Twigs olive. Mature leaves more or less silky on both sides.

Var. β , *cœrulea*.

PLATE MCCCX.

S. cœrulea, *Sm.* Engl. Bot. ed. i. No. 2431.

Twigs olive. Leaves at length glabrous and glaucous beneath, and with a bluish tint.

Var. γ , *vitellina*. *Koch.*

PLATE MCCCXI.

S. vitellina, *Linm.* *Sm.* Engl. Bot. ed. i. No. 1389, and Brit. Fl. ed. iv. p. 182. *Hook. & Arn.* Brit. Fl. ed. viii. p. 401. *Hook.* Brit. Fl. ed. iv. p. 359. *Lindl.* Syn. Brit. Fl. p. 231.

Twigs bright golden-yellow or tinged with red. Leaves glabrous above when mature. "Catkin-scales pointed, longer than either stamens or style." (*Walker-Arnott.*)

By the banks of rivers, and in osier grounds and swamps. Common, and generally distributed, not extending to the extreme north of Scotland. Considered rather a doubtful native of Ireland by the authors of the "*Cybele Hibernica*." Var. β with the type. Var. γ principally in osier grounds.

England, Scotland, Ireland. Tree. Late Spring, early Summer.

A tree attaining a great size, with thick fissured bark; branches more erect than in *S. fragilis*, the shoots of the year generally silky-pubescent. Leaves $2\frac{1}{2}$ to 4 inches long, with the lateral margins more regularly curved from the base to the apex than in *S. fragilis*; and in the typical form, both sides are clothed with silky white hairs, especially when young; when old the upper side becomes green from the pubescence being sparse, the under side in var. β is at length nearly denuded and glaucous. The male catkins are shorter and more slender than those of *S. fragilis*, with the filaments and anthers darker yellow. The female catkins are much more slender and lax than in *S. fragilis* and *S. viridis*, with longer catkin-scales and with very shortly stalked ovaries, which are more ovate and less pointed, and remain green, even when ripe, and have the styles shorter than the stigmas. Both the male and female catkins are more erect while in flower.

The var. γ is now generally considered a variety or unnatural state of *S. alba*. According to Andersson, it is said to be often produced by the annual cutting of the trees, and Fries considers that the state with yellow branches of this and several other species of willows is produced by a disease, as if the plant were jaundiced. There is one point, however, connected with the *S. vitellina* of the original edition of "English Botany," which appears to have escaped the notice of the writers who have studied the willows, with the exception of Dr. Walker-Arnott—this is, the great length of the catkin-scales in proportion to the essential organs, which gives a very different aspect to the plant. To me, however, it appears that this arises mainly from the essential organs being really less developed, as in var. *vitellina* the ovaries have exactly the appearance of abortive capsules, such as are often found intermixed with the perfect ones in the varieties α and β . Such imperfections we might readily expect, if the form be produced by mutilation or disease.

Var. α , *White Willow*. Var. β , *Blue Willow*. Var. γ , *Golden Willow*.

French, *Saule blanc*. German, *Weisse Weide*.

This species of willow is more frequently used for timber than any other. It grows rapidly, and the wood is soft and white, but firm, and adapted for many purposes in which durability is not an object. It answers well for house timber, if not exposed to damp, and is suitable for flooring. In the roofs of houses, rafters of this timber have been known to stand one hundred years. It is in great demand for common casks and other cooper's work, while its softness and whiteness render it valuable to the turner. The younger branches are used for handles for agricultural implements, such as rakes and hoes, and are much lighter than ash, and equally durable, if kept from the weather. Split into thin, long strips, the smaller branches are woven into a material that is much used as a substitute for straw in making hats and bonnets—a manufacture carried on in Caen, in Normandy, as well as in London. As fuel, white willow is not very economical, but burns rapidly, and gives out a great deal of heat,

while it has the advantage of burning well while green. Willow charcoal is esteemed for gunpowder, and at one time was used to the exclusion of all other. The wood loses half its weight in drying, and sometimes even more. The bark, which is thick and full of cracks, is in nearly as great repute for tanning as that of the oak; it is also used in medicine, in the cure of agues, as a substitute for cinchona. According to Gilpin, this is one of the few willows which are "beautiful, and fit to appear in the decoration of any rural scene." The silvery grey of the foliage, caused by the closely-pressed silky hairs, renders this tree remarkable, and conspicuous from a long distance; and when, as often happens, it fringes rivers, it enables us to trace their course across the country—a circumstance ingeniously made use of by landscape-painters. The peculiar colour and the plum-like character of the branches give it also an air of lightness and grace which wonderfully adds to the beauty of the scenery, the contrast with trees of deeper tint producing an effect at once singular and agreeable. The white willow occasionally attains a very large size; one near Bury St. Edmund's is nearly eighty feet high, while the stem measures nineteen feet in girth: it is called the Abbot's Willow, and is supposed to have been planted before the dissolution of the monastery in the reign of Henry VIII. This is a rare instance of longevity in the willow, for it generally becomes hollow after thirty or forty years, and seldom survives more than half a century. It grows best in a moist but well drained soil, and, though liking the neighbourhood of water, should not have its roots constantly immersed.

The blue willow grows more rapidly than the common kind, and has sometimes in a few years produced an amount of timber never obtained from any other tree.

Mr. Loudon says that the golden willow is readily distinguished from all others by the bright yellow colour of its branches. It is much cultivated for basket-work, tying, &c., and also as an ornamental shrub or tree. The rods, being tough and flexible, "are fit for many purposes of basket-work, as well as for package." As an ornamental tree, it is very striking in the winter season, especially among evergreens. In the English garden at Munich extensive masses of this willow are placed in contrast with masses of the white-barked honeysuckle, the red-barked dogwood, and the brown-barked spiræa. The effect in the winter season is very striking, and deserves imitation.

GROUP II.—TRIANDRÆ.

Catkin-scales persistent. Stamens 3.

SPECIES (?) VI.—**SALIX UNDULATA.** Ehrh.

PLATE MCCCXII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCVI. Fig. 1261.

Anders. Mon. Sal. p. 28.

S. triandra-alba, Wimm. Sal. Europ. p. 144.

S. triandra-viminalis, β undulata (exclude ♂), Wimm. Denkschr. d. Schles. Ges. p. 157.

S. lanceolata, Sm. Engl. Bot. ed. i. No. 1436, and Engl. Fl. Vol. IV. p. 168.

Leaves lanceolate-strapshaped or elliptical-strapshaped, longly acuminate, callous-serrate, dark green and shining above, paler below, at length glabrous on both sides, and subcoriaceous. Stipules half-

ovate-cordate, acute. Catkins opening at the same time as the leaf-buds, on short lateral branches, with 2 or 3 leaves at the base, sub-erect, cylindrical, rather thick, dense. Catkin-scales lanceolate-strap-shaped or ovate-strapshaped, pilose with very long white hairs inside and shorter ones outside. Male flowers unknown (?). Capsule ovate-conical, glabrous (pubescent in continental specimens), on a stalk about twice as long as the nectary; style elongated; stigmas shorter than the style, bifid, divaricate. Young branches and young leaves more or less pubescent.

By the banks of rivers and in osier grounds. Rare, and perhaps not native. Near Lewes, Sussex, Mr. Woolgar, confirmed by Borrer; Surrey side of the Thames, Mr. Baker; Audley End, Essex, Rev. J. E. Leece; Otley, N.E. Yorkshire, Mr. Baker. In Scotland it is reported from Forfarshire by Don. In Ireland it occurs in the north, especially about Coleraine, but only where planted.

England, [Scotland, Ireland.] Tree. Late Spring.

A small tree, casting its bark annually, like *S. triandra*, with shortly stalked subcoriaceous leaves, 3 to 5 inches long by $\frac{1}{2}$ to 1 inch wide, sometimes undulated at the margins. It is doubtful if the male flowers of this plant be known, as Andersson considers that the supposed sterile catkins described by Ehrhart belonged to *S. triandra*. Grenier describes the male flowers as diandrous. The female catkins are about 1 inch long while in flower, with yellow silky scales, variable in shape, much shorter than the ovary, with very long hairs towards the apex, often equalling or exceeding the style. Ovary green or olive, smooth and glabrous, at least in all the British specimens.

S. undulata is generally admitted to be a hybrid, of which one of the parents is *S. triandra*. Wimmer considers the other to be *S. alba*, but Andersson now, and Wimmer formerly, considered *S. viminalis* to be the other parent, which to me seems much more probable. In either case its affinities are greatest with *S. triandra*, from which it is readily known by its villous catkin-scales, shorter stalked capsules, and elongated style. The stipules are also smaller and more acute. The catkins bear considerable resemblance to those of *S. viminalis*, which, however, it does not resemble in either its foliage or stipules. It is in the leaves that it differs from the plant now considered by Wimmer as *S. triandra-viminalis*, including *S. mollissima* of Ehrhart and *S. hippophäifolia*, Thuillier, and *S. Trevirani*, Sprengel., which in foliage show a much closer approach to *S. viminalis*, but it seems to me the whole of these and *S. undulata* are a series of hybrids between *S. triandra* and *S. viminalis*.

Sharp-stipuled Triandrous Willow.

French, *Saule olivâtre*. German, *Wellenblättrige Weide*.

SPECIES VII.—**SALIX TRIANDRA.** "*Linn.*" *Koch.*

PLATES MCCCXIII.—MCCCXV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCV. and DCVI. Nos. 1256 to 1260.

Dillot, Fl. Gall. et Germ. Exsicc. No. 2363.

Wimmer, Sal. Europ. p. 12. *Anders.* Mon. Sal. p. 23.

Leaves lanceolate-oblong or oblong-elliptical, acute, callous-serrate, dark green and shining above, paler and often glaucous beneath, glabrous on both sides, at length subcoriaceous. Stipules generally large, half-ovate-cordate, blunt. Catkins opening at the same time as the leaf-buds, on short lateral branches, with 2 or 3 leaves at the base, ascending cylindrical, rather thick, lax. Catkin-scales obovate in the male catkins, and oblanceolate-strapshaped or strapshaped in the female catkins, glabrous, or with shaggy hairs towards the base, and a few longer ones on the inside. Stamens 3; filaments hairy at the base. Capsule ovate-conical, obtuse, glabrous, on a stalk 3 to 5 times as long as the nectary; style scarcely any; stigmas short, thick, notched or bifid, recurved. Underside of the young leaves sometimes with a few hairs.

Var. α , *genuina*.

PLATE MCCCXIII.

Reich. Ic. Fl. Germ. Fig. 1259.

S. triandra, *Linn.* Engl. Bot. ed. i. No. 1435, and Engl. Fl. Vol. IV. p. 166. *Hook.*

Brit. Fl. ed. iv. p. 156.

Young twigs not furrowed. Leaves oblong-lanceolate, narrowed towards the base, paler or glaucous beneath.

Var. β , *Hoffmanniana*.

PLATE MCCCXIV.

S. Hoffmanniana, *Sm.* Engl. Fl. Vol. IV. p. 168. *Borrer*, in E.B.S. No. 2620, *Hook.*

Brit. Fl. ed. iv. p. 357.

Young twigs not furrowed. Leaves broadly elliptical-lanceolate or ovate-lanceolate, rounded at the base, pale green, not glaucous beneath. Stipules larger and more rounded than in var. α .

Var. *γ*, *amygdalina*.

PLATE MCCCXV.

S. amygdalina, *Linn. Sm. Eng. Bot. ed. i. No. 1936*, and *Engl. Fl. Vol. IV. p. 169*.
Hook. Brit. Fl. p. 357.

Young twigs deeply furrowed. Leaves short, ovate-lanceolate, rounded at the base. Stipules larger than in Var. *α*. Leaves glaucous beneath.

By the sides of streams and in wet woods and osier grounds. Common. Generally distributed in England. Rather rare in Scotland, and absent from the north. Not unfrequent in Ireland, but often planted. Mr. Carroll considers it indigenous in Cork.

England, Scotland, Ireland. Tree or shrub. Late Spring, Early Summer, sometimes again in Autumn.

Usually a small tree or shrub, rarely, even when left to itself, attaining a height of 20 to 30 feet, and var. *β* rarely more than 12 feet. Bark on the trunk splitting off in sheets as in the plane-tree. Young branches brownish, breaking off readily at their origin. Leaves variable in shape and size, but usually 2 to 4 inches long when full grown, on short petioles with a few glands at the apex. Stipules variable in size, generally present, entire or serrate, often large and foliaceous on the later shoots. Male catkins 1½ to 3 inches long, with the scales pale yellow, broader towards the apex than in the female catkins, generally hairy towards the base. Stamens surrounded by a double nectary. Female catkins more lax than the male, with narrower and more parallel-sided scales. Nectary single. Ovary in fruit ¼ inch long, reddish. Catkin-scales subpersistent, much shorter than the capsules.

The varieties appear to pass insensibly into each other.

This willow can be confounded only with *S. undulata*, which has leaves of the same texture, but in *S. triandra* they are shorter, the stipules are less acute, and the catkin-scales are glabrous on the outside, at least towards the apex, and are destitute of the long, white, woolly hairs, which are so abundant inside the scales of *S. undulata*. *S. triandra* has also the style scarcely at all developed, and the stigmas much shorter than in *S. undulata*.

S. contorta, *Crowe*, which is cultivated in Sussex under the name of French willow, appears not to be wild in Britain, and is considered by Mr. Borrer as most nearly identical with var. *Hoffmanniana*, but other writers refer it to var. *α*. Hooker and Arnott make it a distinct variety, distinguished by furrowed young twigs, linear-lanceolate leaves green on both sides, and acuminate capsule.

Almond-leaved Willow.

French, *Saule à trois élamines*. German, *Mandelblüttrige Weide*.

SECTION II.—CAPRISALIX. *Dumort.*

Catkins sessile, or shortly stalked in fruit, leafless, or with 2 or 3 small leaves at the base, lateral, appearing before or with the leaves. Catkin-scales usually discoloured at the end. Nectary of one piece on the opposite side of the stamens or pistil from the catkin-scale, i.e. between the essential organs of the flower and the rachis of the catkin.

SUB-SECTION I.—HELICE. *Dumort.*

Nectary wedgeshaped. Stamen 1, with a 4-celled anther—or 2 and monadelphous, with 2-celled anthers; anthers dull red, ultimately black.

Shrubs or small trees, with equitant vernation, and catkins bracteate at the base. Leaves glabrous, often opposite.

SPECIES VIII.—**SALIX PURPUREA.** *Linn.*

PLATES MCCCXVI. MCCCXVII. MCCCXVIII.

Billot, Fl. Gall. et Germ. Exsicc. No. 1956.

Wimmer, Sal. Europ. p. 29.

Leaves alternate and opposite, oblanceolate-oblong or oblong, usually enlarged towards the apex, shortly acuminate or acute, very faintly but acutely serrate, opaque, green above, paler and often glaucous beneath, glabrous on both sides. Stipules half-ovate, often absent. Catkins opening before the leaf-buds, subsessile, with small foliaceous bracts at the base, cylindrical at first, erect, afterwards spreading or slightly recurved, rather slender, dense. Catkin-scales ovate-obovate, blunt, pilose or more or less woolly. Stamens 2; filaments combined to the apex, pilose at the base. Capsule broadly ovate-ovoid, obtuse, tomentose (rarely subglaucous), subsessile; style scarcely any, or at least much shorter than the stigmas; stigmas short, spreading, entire, notched, or, more rarely, at length 2-cleft. Young branches and very young leaves sometimes with a few hairs.

Var. *α*, *genuina*.

PLATE MCCCXVI.

Reich. Ic. Fl. Germ. et Holv. Vol. XI. Tab. DLXXXII. Fig. 1230.

S. purpurea, *Sm.* Engl. Bot. ed. i. No. 1388, Engl. Fl. Vol. IV. p. 87. *Hook.* Brit. Fl. ed. iv. p. 355.

Decumbent. Young branches purple. Leaves narrowly oblong-oblanceolate. Stigmas nearly sessile, very short, thick, ovate, obtuse.

Var. β , *Woolgariana*.

PLATE MCCCXVII.

S. Woolgariana, *Borrer* in E.B.S. No. 2651, and *Hook.* Brit. Fl. ed. iv. p. 364.
S. ramurosa, "*Borrer*" in *Leech's* *Salicet.* Brit.

Erect. Young branches, yellowish, sometimes tinged with red. Leaves oblong-oblanccolate or wedgeshaped-oblanccolate. Stigmas subsessile, short, rounded, slightly notched. Female catkins larger than in var. α .

Var. γ , *Lambertiana*.

PLATE MCCCXVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXXV. Fig. 1235 (?).
S. Lambertiana, *Sm.* Engl. Bot. ed. i. No. 1359, and Engl. Fl. Vol. IV. p. 189. *Hook.*
 Brit. Fl. ed. iv. p. 354.

Erect. Young branches purplish, glaucous. Leaves broadly oblong, very slightly narrowed towards the base. Stigmas nearly sessile, very short, thick, ovate, obtuse, notched.

By the banks of rivers, in meadows, and osier grounds. Common, and generally distributed, but not reaching the extreme north of Scotland, and said to be doubtfully indigenous in Ireland.

England, Scotland, Ireland. Shrub. Spring.

A bush or small tree 4 to 10 feet high, with very tough virgate branches, which are remarkable amongst the willows by having the leaves, and consequently the catkins, frequently opposite, but the opposite and alternate arrangement occurs on the same plant. The young branches are often more or less tinted with bright crimson or purple. The leaves are very shortly stalked, 3 to 6 inches long, by $\frac{1}{4}$ to 1 inch broad at the broadest part, which is generally about half-way between the middle and the apex, dull green, slightly glaucous above, and often considerably so beneath. Male catkins $\frac{3}{4}$ to $1\frac{1}{2}$ inch long, by $\frac{1}{4}$ inch in diameter. Catkin-scales greenish at the base, with a large purplish black spot covering the whole of the apex. Stamens at first red, ultimately nearly black, remarkable for having the stamens so completely combined that there seems to be but one stamen, with a 4-lobed anther. Female catkins $\frac{3}{4}$ to 1 inch long, with the scales generally spotted as in the male; ovary short, thickly clothed with short hairs, and tipped by a style, which at first is scarcely visible, but afterwards elongates slightly; stigmas very short, with thick segments, at first entire, afterwards notched.

The varieties pass insensibly into each other. Var. *Lambertiana* is remarkable for the breadth of its leaves, and their being less tapered

towards the base than in the other forms, and it has also the young branches more glaucous. The young branches and leaves, as observed by Smith, bear some resemblance to those of a honeysuckle, and are at first more or less downy. Stipules are very rarely found in any of the forms, except on strong shoots springing up when the plant has been cut down.

Vars. α and β , *Purple Willow*. Var. γ , *Boyton Willow*.

French, *Saule à une étamine*. German, *Purpur Weide*.

The common name of osier is frequently given to this willow, and the young annual shoots are in great request for the finer descriptions of basket-work, being very slender, tough, and flexible, and becoming very white when peeled. It is, therefore, often grown in osier beds, but not much cultivated. The bark is so extremely bitter that rabbits and hares will not touch the plant. It is consequently well adapted for forming fences round warrens, or for protecting gardens from the depredations of these little animals.

SPECIES (?) IX.—**SALIX DONIANA.** *Sm.*

PLATE MCCCCLXV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXXIV. Fig. 1233.

Engl. Fl. Vol. IV. p. 213. Hook. Brit. Fl. ed. iv. p. 361. Hook. & Arn. Brit. Fl. ed. viii. p. 403. Bab. Man. Brit. Bot. ed. vi. p. 313.

S. repens-purpurea, Wimm. Sal. Europ. p. 171.

S. purpurea, var. sericea, Reich. Ic. l. c. p. 22.

Leaves alternate and subopposite, oblanceolate, broadest beyond the middle, acute, very faintly denticulate or serrate, dull green above, at length glabrous, with prominent reticulate veins when dried, livid-glaucous beneath, at length nearly glabrous. Stipules lanceolate, generally absent. Catkins opening before the leaf-buds, the male catkins with small subsessile nonfoliaceous bracts at the base, cylindrical, slender, dense; female catkins rather slender, dense, erect-ascending, with a few subfoliaceous bracts at the base. Catkin-scales oblanceolate or obovate, blunt, pilose. Stamens 2, with the filaments combined nearly to the apex, slightly pilose at the base. Capsule ovate-conical, not acuminate, silvery-silky tomentose, rarely glabrous, on a stalk twice or thrice as long as the nectary; style very short, shorter than the stigmas; stigmas ovate, short, thick, entire or notched. Young leaves more or less thickly silky hairy, with adpressed pubescence especially beneath; young branches very slightly pubescent, soon quite glabrous.

Sent from Scotland (probably Forfarshire) by G. Don to Anderson.

Scotland. Shrub. Late Spring and early Summer.

Of this plant the female alone has been reported as British. I have

seen only dried and cultivated specimens, so I follow Mr. Borrer's description in "Engl. Bot." Suppl.:—"Shrub 6 feet high or a little more branched from the base. Branches procumbent at their origin, then upright, straight and wandlike at first, afterwards producing numerous small twigs, silky while very young, soon denuded, of a greenish ash colour, sometimes tinged with purple, old bark grey, not so remarkably yellow within as in the monandrous species, buds red, slightly downy. Leaves on short broadish foot-stalks, some of the lower ones in pairs, the rest spirally scattered." Largest leaves 1 to $1\frac{1}{2}$ inch long, shaped like those of *S. purpurea*, but with the texture and reticulation, when dry, of those of *S. repens*, at first more or less thickly clothed with shining silky hairs, which soon disappear from the upper surface, and partially from the lower. Female catkins $\frac{1}{2}$ to $\frac{3}{4}$ inch long. Catkin-scales purplish, nearly black at the apex, shorter than the capsules. Capsules silky white, blunt at the apex.

On the Continent the male catkins have been found, and are about $\frac{3}{4}$ inches long, the anthers are at first reddish, afterwards becoming fuscous; the filaments united from the base for about three parts of their length.

Wimmer mentions a form in which the capsules are glabrous. In his specific description he gives "germina . . . sessilia," but this seems to be an error, as in the detailed description he states: "germina . . . in pedicello $\frac{1}{3}$ germinis longitudine." He says it is a shrub 2 to 3 feet high.

Donian Willow.

SPECIES (?) X.—**SALIX RUBRA.** *Huds.*

PLATES MCCCXIX. MCCCXX. MCCCXXI.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXXVI. Fig. 1286.

Billot, Fl. Gall. et Germ. Exsicc. No. 286.

S. viminalis-purpurea, Wimm. Sal. Europ. p. 173.

Leaves alternate, rarely subopposite, strapshaped-elliptical or oblong-elliptical, broadest near the middle or a little beyond it, acute or acuminate or oblong-oblancoate, very faintly and bluntly serrate, bright green, smooth, and rather glossy above, paler or glaucous beneath, at length generally glabrous on both sides, rarely silky-hairy beneath. Stipules lanceolate, often absent. Catkins opening before the leaf-buds expand; the male catkins subsessile, with small non-foliaceous bracts at the base, cylindrical, thick, dense, at first erect, afterwards spreading, recurved-spreading; female catkins rather thick, dense, suberect, with a few foliaceous bracts at the base. Catkin-scales oval-oblancoate, blunt, pilose. Stamens 2, with the filaments combined only at the base, or united to the apex, pilose at the base. Capsule ovate-conical, acuminate, tomentose, subsessile; style as long

as the stigmas; stigmas rather long, curved, divergent, strapshaped or elliptical, notched or bifid. Young leaves faintly pubescent or subglabrous; young branches subglabrous or glabrous.

Var. α , *genuina*.

PLATE MCCCXX.

S. rubra, *Sm.* Engl. Bot. ed. i. No. 1145. Engl. Fl. Vol. IV. p. 191. *Hook.* Brit. Fl. ed. iv. p. 355. *Hook. & Arn.* Brit. Fl. ed. viii. p. 398.
S. fissa, *Hoffm.* Hist. Sal. Vol. I. p. 61.

Leaves alternate, elliptical-strapshaped, attenuated at each end, broadest in the middle, paler and glabrous beneath. Filaments free except at the base. Stigmas undivided or notched, rarely 2-cleft.

Var. β , *Forbyana*.

PLATE MCCCXXI.

S. Forbyana, *Sm.* Engl. Bot. ed. i. No. 1344. Engl. Fl. Vol. IV. p. 191. *Hook. & Arn.* Brit. Fl. ed. viii. p. 398. *Hook.* Brit. Fl. ed. iv. p. 355.

Leaves alternate, rarely opposite, oblong-elliptical, generally broadest a little beyond the middle, glaucous, and at length glabrous below. Filaments united to the apex. Stigmas linear, usually 2-cleft.

Var. γ , *Helix*.*

PLATE MCCCXIX.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXXIII. Fig. 1232.
S. Helix, "*Linn.*" *Sm.* Engl. Bot. ed. i. No. 1343, and Engl. Fl. Vol. IV. p. 188.
Hook. & Arn. Brit. Fl. ed. viii. p. 398.
S. purpurea, var. *Helix*, *Bab. Man.* Brit. Bot. ed. vi. p. 310 (?).

Leaves frequently opposite, narrowly oblong-ob lanceolate, broadest beyond the middle, glaucous, and at length glabrous below. Filaments united to the apex. Stigmas linear, usually 2-cleft.

By the sides of rivers and in meadows and osier grounds. Rather rare. Var. α more abundant in the north of England and south of Scotland. Var. β chiefly in the east of England. Var. γ , said by Smith to be common, but I have not seen it except in his herbarium, "from Mr. Crowe's garden." Both forms occur in Ireland, but are considered doubtfully native there.

* Misnamed *S. purpurea*, var. *Helix*, on Plate MCCCXIX.

England, Scotland, Ireland. Tree or shrub. Spring.

The typical form (var. α) of this, which is doubtless a hybrid between *S. purpurea* and *S. viminalis*, is a shrub or small tree, generally not more than 6 feet high, with long upright smooth purplish branches. Leaves resembling those of the common osier in shape, but differing in being bright green and at length glabrous on both sides. Barren catkins 1 to $1\frac{1}{2}$ inch long, without leaves at the base, but with a few pilose bracts. Female catkins $\frac{3}{4}$ to 1 inch long, with several leaves at the base; the scales on both catkins with a black apex, as in *S. purpurea*. Stamens with the filaments united at the base, but free for the greater part of their length. Anthers at length dull lead-coloured. Ovary more attenuated upwards than in *S. purpurea*, with a much longer style, and with longer, narrower, and more recurved stigmas.

Var. β differs in its much broader leaves, which are 2 to 4 inches long by $\frac{3}{4}$ to 1 inch broad. The female catkins are very like those of *S. purpurea*, but have a longer style and longer stigmas, but the leaves are much broader and less attenuated towards the base, and glossy (not opaque) above; they are also more pubescent when young. The male plant of var. β is unknown, but Smith found 1 or 2 male flowers at the base of the fertile catkins, and these had the filaments united nearly to the apex, as in *S. purpurea*.

Var. γ is a small slender tree or large shrub, with long tough smooth polished pale yellow twigs. Leaves similar in shape to those of *S. purpurea*, but longer and narrower. Male catkins similar to those of *S. purpurea*, but rather larger. Female catkins with the ovary more conical and terminated by a conspicuous style and long stigmas closely resembling those of *S. rubra*, vars. α and β . Catkin-scales with a black apex, as in *S. purpurea*.

S. Helix is a very puzzling plant, unless Mr. Borrer be correct in supposing that Smith has taken a narrow-leaved male plant of *S. purpurea*, and a female of *S. rubra*, var. *Forbyana*, and described the two as the male and female of his *S. Helix*. If this be not so we must regard it as one of the series of hybrids between *S. purpurea* and *S. viminalis*, but approaching closely to *S. purpurea*, with which it agrees in the male catkins; the female catkins are scarcely distinguishable from those of *S. rubra*, vars. α and β .

Var. α , *Green-leaved Osier*. Var. β , *Fine Basket Osier*.

Var. γ , *Rose Willow*.

French, *Saule monadelphé*. German, *Rothe Weide*.

This species of willow is valuable in cultivation as an osier for bands, crates, basket-work or wicker-work, and even small hoops.

In the bark of this willow is found a larger quantity of salicin, the peculiar active principle of the genus, than in any other species. At one time this substance was largely used in medicine before the employment of quinine. It forms a tolerable

SUB-SECTION II.—VIMEN. *Dumort.*

Nectary linear. Stamens 2, monadelphous, or free; anthers ultimately yellow.

Shrubs or small trees, with alternate leaves with revolute vernation, and catkins bracteate at the base. Pubescence of the leaves silky

SPECIES XI.—**SALIX VIMINALIS.** *Imm.*

PLATE MCCCXXII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXCVII. Fig. 1248.

Billot, Fl. Gall. et Germ. Essicc. No. 1958.

Wimmer, Sal. Europ. p. 36. *Sm.* Engl. Bot. ed. i. No. 1898, and Engl. Fl. Vol. IV. p. 228.

Leaves strapshaped or lanceolate strapshaped, attenuated at each end, acute, undulated and entire at the margins, which are revolute when young, smooth and green above, white with satiny hairs beneath. Stipules small, narrowly lanceolate. Catkins opening before the leaf-buds expand, subsessile; the male catkins with small nonfoliaceous bracts at the base, oblong, dense, at first erect, afterwards spreading; female catkins short, cylindrical, rather thick, dense, suberect or spreading, with small subfoliaceous bracts at the base. Catkin-scales oblong or oblong-oblancoate, pilose, brown. Stamens 2; filaments free, glabrous. Capsule ovate-conical, white, tomentose, subsessile; style long, usually nearly equalling the stigmas; stigmas long, linear, entire or notched, very rarely bifid. Young branches and buds more or less softly downy; young leaves at first downy on both sides, afterwards glabrous above.

Var. α , *genuina*.

Leaves strapshaped. Style as long as or longer than the stigmas; stigmas undivided.

Var. β , *intricata*. *Leefe*.

Leaves lanceolate-strapshaped. Capsule shorter and broader than in var. α . Style shorter than the stigmas; stigmas very long, generally cleft.

By the sides of streams and in moist meadows and in osier beds. Very common, and generally distributed, except in the north of Scotland. Considered a doubtful native of Ireland.

England, Scotland, Ireland. Shrub or tree. Spring.

A bush or small tree, rarely above 10 feet high, but occasionally attaining to 20 or 30 feet, with very long straight virgate branches, more or less silky-downy when young, at length polished and olive or chestnut. Leaves very numerous, 4 inches to 1 foot long, with short petioles. Buds thinly downy. Male catkins $\frac{3}{4}$ to $1\frac{1}{4}$ inch long. Catkin-scales brown, darker towards the apex. Anthers bright yellow. Female catkins $\frac{3}{4}$ to 1 inch in flower, lengthening in fruit. Ovary $\frac{1}{2}$ inch long, at first almost sessile, afterwards with a stalk which is shorter than the narrow long incurved nectary.

The length of the style and stigmas are liable to a slight variation, and also the width of the leaves. On the whole this is one of the best marked species of the genus *Salix*. Judging from the Rev. Mr. Leefe's specimens, I am unable to separate his vars. *intricata* and *stipularis*.

Common Osier.

French, *Saule à longues feuilles*. German,

This is the true osier, and is cultivated extensively on account of its long pliant shoots, which exceed in length those of any other species. The use of willows in basket-making seems to be of very ancient date. Martial, in a well-known verse, alludes to the practice by the ancient Britons. Translated it reads thus:—

“From Britain's painted sons I came,
And basket is my barbarous name,
But now I am so modish grown,
That Rome would claim me for her own.”

The Druids are said to have formed huge figures of wicker-work, which on great occasions were filled with criminals and set fire to; but these baskets, according to Burnet and others, were made from twigs of the oak, and not of the willow. The Celtic Britons used the willow twigs, however, for constructing their skin-covered boats and shields. The present species of willow was cultivated in Holland from the first establishment of the herring fishery in that country in 1164, for the purpose of

making hoops for containing salted herrings. Dr. Walker tells us that the Dutch boors, without any knowledge of the sexes of plants, selected for propagation those willows which appeared to be of the most vigorous growth, and thus unintentionally propagated only the female. As all the plants originally grown in England were obtained from Holland, we suppose the same must be the case in a great measure here.

S. viminalis is easier of culture than any other kind of willow. It will grow anywhere in moist soil where the water is not absolutely stagnant, but it does not like peat or moss. Ground on the banks of rivers which can be well irrigated, and also well drained, is the best for the purpose. Osier plantations must be carefully hoed and cleaned every year. Nothing contributes more to a good crop of twigs than keeping the soil and the plants clean. A basket-maker finds more service from a twig 6 or 8 feet long than from one 3 or 4 feet long. Osiers are usually cut in the autumn, directly after the fall of the leaf, and tied up in bundles for immediate sale, or placed with their thick ends in water, where they remain till the early spring, when they are peeled for the finer kinds of basket-work. The operation of peeling is very simple, and is commonly done by infirm or old men and women at so much a bundle. It is done with a little instrument which fixes into the ground, and through which the twig is drawn and deprived of its bark. All large baskets and hampers are made from rods of *S. viminalis*. In Germany, and also frequently in Scotland, the willows, after being cut and tied up in bolls, are stacked or kept in an airy shed, and when the bark is to be removed it is done by boiling or steaming them. Rods thus prepared are supposed to be more durable than others. Basket-making is a very simple operation in its commonest form, and used to constitute part of the knowledge of every gardener and country labourer; it has, however, fallen into disuse among this class of people, and has become a trade of itself.

SPECIES (♀) XII.—**SALIX STIPULARIS.** *Sm.*

PLATE MCCCXXIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXCVIII. Fig. 1249.

Wimm. Sal. Europ. p. 184.

Sm. Engl. Bot. ed. i. No. 1214, Engl. Fl. Vol. IV. p. 230.

S. viminalis-dasyclados, *Wimm.* Denkschr. d. s. Ges. p. 162. *Wimm.* Sal. Europ. p. 185.

Leaves strapshaped-lanceolate or narrowly-lanceolate, acute, slightly undulated, and very faintly crenate-serrate, or nearly entire at the margins, which are revolute when young, smooth and green above, greyish-white with satiny hairs beneath. Stipules large, stalked, lanceolate, half-cordate. Catkins opening before the leaf-buds expand, subsessile, the male with small nonfoliaceous bracts at the base, oblong, suberect. Female catkins very long, cylindrical, thick, dense, suberect, with small subfoliaceous bracts at the base. Catkin-scales oblong-ob lanceolate, pilose, brown at the apex. Stamens 2; filaments free, glabrous. Capsule ovate-ovoid, white-tomentose, subsessile; style shorter than the stigmas; stigmas very long, linear, undivided,

spreading. Young branches and buds more or less softly downy; young leaves at first downy above, at length glabrous.

In osier holts, hedges, and woods. Rare. Near Bury St. Edmund's, Suffolk. There is also a specimen in the British Herbarium of the Linnæan Society, from "Lea Bridge Road, Essex." It is also reported as found in Scotland by Mr. David Don, but this requires confirmation.

England, Scotland (?). Shrub. Early Spring.

This plant I have never seen alive, and possess no specimens of it. Smith describes it as hairy, the twigs upright, tall, soft, and downy, of a pale reddish-brown, brittle, and of little use as an osier. The leaves in the dried specimens I have seen vary from 5 to 7 inches in length, but probably there is a greater range in their size; they are broader than those of *S. viminalis*. The most remarkable point of difference, however, is the great size of the stipules upon the later shoots. These are frequently about 1 inch long, longer than the petioles, more or less distinctly stalked, acute, crenate at the base on the outer side, which is much more developed than the other. Male catkins about 1 inch long, somewhat like those of *S. cinerea*. Female catkins very long, 2 to 3 inches, or even more when in fruit. Stigmas extremely long. Stalk of the ovary shorter than the long cylindrical incurved scale.

Wimmer considers this certainly a hybrid between *S. viminalis* and some other species, probably *S. dasyclados* (*Host.*), which is not known with certainty to be a British species.

Auricled Osier.

French, *Saule à grandes stipules*. German, *Nebenblatt Weide*.

SPECIES (?) XIII.—**SALIX SMITHIANA.** *Willd.*

PLATE MCCCXXIV.

Sm. Engl. Fl. Vol. IV. p. 229. *Hook.* Brit. Fl. ed. iv. p. 364. *Hook. & Arn.* Brit. Fl. ed. viii. p. 406.

S. Smithiana, var. *a.* *Bab.* Man. Brit. Bot. ed. vi. p. 310.

S. Caprea-viminalis. *Wimm.* Sal. Europ. p. 178.

S. mollissima, *Sm.* Engl. Bot. No. 1509 (non *Ehrh.*).

Leaves oblong-lanceolate or lanceolate-elliptical, acute, slightly undulated and very faintly crenate or nearly entire on the margins, which are revolute when young, smooth and bright green above, with the veins but faintly impressed, greyish-white, with somewhat satiny hairs beneath. Stipules small (rarely rather large), sessile, lanceolate, sometimes half-cordate, at length crescent-shaped. Catkins opening before the leaf-buds expand; the male catkins subsessile, with small

Var. *α*, *genuina*.

PLATE MCCCXXIV.

Stipules small, lanceolate, not a quarter as long as petioles, unequal, but scarcely half-cordate at the base.

Var. *β*, *stipularis*.

S. stipularis(?) *Anders.* in Bot. Gaz. Vol. III. p. 58 (quoad *Leefe*, Sal. Brit. Nos. 25 and 26), non *Sm.*

Stipules large, half as long as the petioles, half-cordate at the base.

By the sides of rivers, and in meadows, osier grounds, and damp woods. Rather common, and generally distributed, except in the north of Scotland. Not unfrequent in Ireland.

England, Scotland, Ireland. Shrub. Spring.

A bushy shrub, with long round virgate reddish brittle branches, the twigs of the year softly downy. Leaves shortly stalked, 3 to 6 inches long, variable in form, but usually inclining to lanceolate, and tapering more towards the apex than at the base when full-grown. Stipules shorter than the leaf-stalks, more or less curved. Catkins about 1 inch long, the female ones at length increasing to 1½ or 2 inches. Stalk of the ovary about as long as the scale, which is oblong. Style variable in length, sometimes very short until after flowering.

The var. *β* is often mistaken for *S. stipularis*, but that plant has the leaves narrower and more parallel-sided, and the stipules are larger and distinctly stalked. It has the female catkins also much longer.

Silky-leaved Osier.

German, *Smith Weide*.

SPECIES XIV.—**SALIX FERRUGINEA.** *Anders.*

PLATE MCCCXXV.

S. cinerea-viminalis. *Wimm.* *Sal. Europ.* p. 181.

Leaves oblong-elliptical or strapshaped-elliptical, often acuminate, acute, distinctly undulated and repand and very finely serrate on the margins, which are revolute when young, rugose and dull green above, with the veins impressed, dull grey with cottony or woolly hairs beneath. Stipules usually rather large (rarely large), subsessile, shortly stalked, or subsessile, lanceolate or ovate-half-cordate, at length crescentshaped. Catkins opening before the leaf-buds expand; the male catkins with small nonfoliaceous bracts at the base, ovate-oblong, subsessile; the female catkins rather long, cylindrical, rather thick, dense, shortly stalked, with small foliaceous bracts at the base. Catkin-scales strapshaped-oblanccolate, pilose, brown at the apex. Stamens 2; filaments free, glabrous. Capsule lanceolate-conical, grey, silky-tomentose, on a stalk longer than the nectary; style generally short, about as long as the stigmas; stigmas rather short, oblong, usually entire. Young branches downy; buds downy or subglabrous; upper side of the leaves at first downy, and often remaining so permanently.

Var. *α*, *genuina*.

PLATE MCCCXXV.

S. ferruginea, *Borrer* in *E.D.S.* No. 2665, and *Hook.* *Brit. Fl.* ed. iv. p. 364, *Hook. & Arn.* *Brit. Fl.* ed. viii. p. 407.

S. Smithiana, var. *γ*. *Bab. Man. Brit. Bot.* ed. vi. p. 311.

Style as long as the stigmas; stigmas narrowly oblong.

Var. *β*, *rugosa*.

S. rugosa, *Leech*, *Sal. Brit.*

S. holosericea, *Borrer* in *Hook.* *Brit. Fl.* ed. iv. p. 364. *Hook. & Arn.* *Brit. Fl.* ed. viii. p. 407 (non *Willd.* nec *Koch.*).

S. Smithiana, *β rugosa*, *Bab. Man. Brit. Bot.* ed. vi. p. 311.

S. acuminata, var. *rugosa*, *Sm.* *M.S.*

Style shorter than the stigmas; stigmas broadly oblong. Leaves more silky below than in var. *α*. Catkin-scales darker and more hairy.

By river sides and in wet places. Not unfrequent in England. Fifeshire, Scotland. I have no record of its occurrence in Ireland. Var. *β*, Lewes, Sussex; Richmond, Yorkshire; Pinley, Warwickshire.

England, Scotland. Shrub. Spring.

A bushy shrub, much resembling *S. Smithiana*, but with the leaves smaller, more attenuated towards the two extremities, more gradually acuminate, the margins more undulated and more distinctly serrate, duller green and more often hairy above, when mature duller grey and less silky beneath, the veins much more deeply impressed above, and more prominent beneath; the stipules usually distinctly stalked, broader, more cordate at the base. The female catkins are longer. The capsule more slender, and on a longer stalk; the style shorter; and the stigmas shorter, thicker, and almost always entire.

Dr. Wimmer quotes specimens from Pinley as his *S. cineraciviminalis*.

Ferruginous Osier.

SUB-SECTION III.—VETRIX. *Dumort.*

Nectary wedgeshaped. Stamens 2, free; anthers ultimately dull yellow.

Shrubs or small (rarely large) trees, with equitant vernation and catkins with or without bracts at the base. Leaves pubescent or glabrous, the pubescence generally crisped or woolly.

GROUP I.—CAPRÆ.

Style short. Catkin-scales rather small, brown at the apex.

Shrubs or trees. Stipules reniform.

SPECIES (?) XV.—**SALIX ACUMINATA.** *Sm.*

PLATE MCCCXXVI.

Engl. Bot. ed. i. No. 1434. Eng. Fl. Vol. IV. p. 227. *Borrer* in *Hook.* Brit. Fl. ed. iv. p. 364. *Hook. & Arn.* Brit. Fl. ed. viii. p. 407. *Bab. Man.* Brit. Bot. ed. vi. p. 311. (non *Hoffm.*).

S. Calodendron, *Wimm.* Sal. Europ. p. 187.

S. Caprea-dasyclados, *Wimm.* Denkschr. d. Schles. Ges. p. 163.

S. dasyclados, *Anders.* in Bot. Gaz. Vol. III. p. 59, quo ad No. 37, *Leech*, Sal. Brit. (non *Wimm.*).

Leaves oblong-elliptical or oblong-oblongeolate, acuminate, acute, slightly undulated, and repand-crenate and very finely serrate at the margins, which are narrowly reflexed, but never revolute, even and dull green and finely pubescent above, glaucous and pubescent with white hairs beneath. Stipules sessile, at length lunate, half-cordate or cordate-sagittate at the base. Male flowers unknown (?), (stamens 2, *Smith*). Female catkins shortly stalked, with several large foliaceous

bracts at the base, oblong-cylindrical, rather thick, dense. Catkin-scales oblanceolate, hairy. Capsule hairy, ovate-conical, on a stalk rather shorter than the nectary, or not much exceeding it; style nearly as long as the stigmas; stigmas short, ovate-oblong, undivided. Young branches and buds softly downy.

In rather moist woods and hedges. "Frequent." *Smith*.

England, Scotland, Ireland. Tree or Shrub. Early Spring.

A tree sometimes attaining considerable size, with grey bark and brown twigs, of which the young ones are densely and softly hairy. Leaves rather shortly stalked, 3 to 5 inches long, $\frac{3}{4}$ to $1\frac{1}{2}$ inch broad, with the veins prominent and reddish straw-colour beneath, the whole surface densely pubescent beneath when young, and remaining so even when mature. Stipules commonly present on the barren shoots, at first half-ovate, afterwards curving, denticulate, strongly nerved, glaucous on the outer side. Catkins suberect, slightly curved, $1\frac{1}{4}$ to 2 inches long. Catkin-scales bearded, blackish at the apex. Nectary large, oblong.

Dr. Wimmer considers this a hybrid, of which *S. dasyclados* may be one of the parents, and either *S. Caprea* or *S. cinerea* the other, but it is impossible to speak with certainty upon this point. As *S. dasyclados* is not known to occur in Britain, if it should be discovered to be one of the parents of *S. acuminata*, the latter could not be considered truly native.

Long-leaved Sallow.

SPECIES XVI.—**SALIX CINEREA.** *Linn.*

PLATES MCCCXXVII.—MCCCXXIX.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXXVI.

Billot, Fl. Gall. et Germ. Exsicc. No. 2364.

Wimm. Sal. Europ. p. 47. *Anders.* Mon. Sal. p. 71. *Hook. & Arn.* Brit. Fl. ed. viii. p. 407. *Bab. Man.* Brit. Bot. ed. vi. p. 311.

Leaves oblong-oblanceolate or -obovate or elliptical-oblong, broadest beyond the middle, often wedgeshaped at the base, acuminate and acute or obtuse and apiculate, more or less undulated and repand-crenate, and finely serrate at the margins,* which are usually narrowly reflexed but never revolute, even and dull ashy-green and usually finely pubescent above, more or less glaucous and pubescent with white or reddish-brown hairs beneath. Stipules sessile, at length lunate, half-cordate at the base. Catkins opening before the leaf-buds, subsessile, with a few nonfoliaceous bracts at the base; the male catkins oblong, the female cylindrical. Catkin-scales oblong-oblanceolate, hairy

* At least the later leaves.

or pilose. Stamens 2; filaments free, pilose at the base. Capsule conical, greyish tomentose, on a stalk much longer than the nectary: style scarcely any, always shorter than the stigmas; stigmas short, oblong, entire or 2-cleft. Branches of the year and buds pubescent..

Var. α , *genuina*.

PLATE MCCCXXVII

S. cinerea, *Sm.* Engl. Bot. ed. i. No. 1897. Engl. Fl. Vol. IV. p. 215. *Hook.* Brit. Fl. ed. iv. p. 364.

Leaves oblong-oblongeolate, rather rigid, usually recurved at the margins, glaucous, and often with reddish brown hairs beneath. Stipules rather large.

Var. β , *aquatica*.

PLATE MCCCXXVIII.

S. aquatica, *Sm.* Engl. Bot. ed. i. No. 1437. Engl. Fl. Vol. IV. p. 218. *Hook.* Brit. Fl. ed. iv. p. 365.

S. Caprea-cinerea, *Wimm.* Sal. Europ. p. 199.

S. cinerea, var. *latifolia*, *Anders.* Mon. Sal. p. 72.

Leaves obovate, or oblong-obovate, rather thin, slightly glaucous, and with the hairs usually white beneath. Stipules large.

Var. γ , *oleifolia*.

PLATE MCCCXXIX.

S. oleifolia, *Sm.* Eng. Bot. ed. i. No. 1402. Engl. Fl. Vol. IV. p. 219. *Hook.* Brit. Fl. ed. iv. p. 365.

Leaves elliptical-oblong or narrowly oblong-oblongeolate, rigid, flat, glaucous, with the hairs generally reddish-brown beneath. Stipules small.

In moist woods, hedgerows, meadows, and by the sides of streams. Very common, and generally distributed.

England, Scotland, Ireland. Tree or shrub. Early Spring.

A variable plant, sometimes only a few feet high, sometimes, though more rarely, reaching to 20 or 30 feet high. Leaves variable in shape, the earlier ones often quite entire, the later commonly more or less serrate and 1 to 3 inches in length, the veins commonly very prominent beneath. The stipules are generally present on the barren shoots, and vary considerably in shape. The catkins are about 1 inch long while in flower; the female at length $1\frac{1}{2}$ to 2 inches long. Catkin-scales brownish-black towards the apex. Capsules on very

long stalks, the style often scarcely distinguishable, at least until after flowering.

It differs from *S. acuminata*, *Sm.* in the leaves being more narrowed towards the base, less acuminate, the female catkins shorter, the capsule with a much longer stalk, and the styles much shorter.

The varieties run so into each other, that it is often impossible to say to which of the three a form ought to be referred.

Common Sallow.

French, *Saule cendré.* German, *Graue Weide.*

This tree is a type of the willows which are known by their downy branches and rusty glittering hue. The willow makes good copse wood, growing rapidly, and yielding a supply of long branches adapted for poles and hoops, and a variety of other purposes. It makes one of the best kinds of charcoal for gunpowder. None of the species do well in dry land. They require an abundant supply of moisture. The bark may be used for tanning, and is applied medicinally sometimes. Gerard tells us that Dioscorides writeth, "Being burnt to ashes and steeped in vinegar, it takes away cornes and other like risings in the feet and toes." "Divers," saith Galen, "doe slit the bark while the withy is in flowering, and gather a certain juyce with which they use to take away things that hinder the sight, and this is when they are constrained to use a cleansing medicine of thin and subtile parts." Both Gerard and Culpepper tell us that "'Tis a fine cool tree, the boughs of which are very convenient to be placed in the chamber of one sick of a fever, which thing is a wonderfull refreshing to the sicke patient."

SPECIES XVII.—**SALIX AURITA.** *Lin.*

PLATE MCCCXXX.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXV.

Billot, Fl. Gall. et Germ. Exsicc. No. 848.

Wimm. Sal. Europ. p. 51. *Anders.* Mon. Sal. p. 69. *Sm.* Engl. Bot. ed. i. No. 4087, and Engl. Fl. Vol. IV. p. 216. *Hook.* Brit. Fl. ed. iv. p. 365. *Hook. & Arn.* Brit. Fl. ed. viii. p. 408. *Bab.* Man. Brit. Bot. ed. vi. p. 311.

Leaves obovate or subrotund- or oblong-obovate, often wedgeshaped at the base, broadest beyond the middle, obtuse and apiculate or shortly cuspidate, undulated and faintly serrate at the margins, which are narrowly reflexed but never revolute, rugose (from the veins being deeply impressed) and dull opaque green and usually pubescent above, more or less glaucous and pubescent with white or reddish-brown hairs beneath. Stipules shortly stalked or subsessile, half-reniform. Catkins opening rather before the leaf-buds, subsessile, with a few nonfoliaceous bracts at the base; the male catkins oblong, the female shortly cylindrical. Catkin-scales strapshaped, sparingly pilose. Stamens 2; filaments free, nearly glabrous at the base. Capsule subulate-conical, whitish-tomentose, on a stalk three to five times as long as the nectary;

style scarcely any; stigmas short, ovate, entire or notched. Branches of the year finely downy, and buds subglabrous or glabrous.

Var. α, genuina.

Leaves obovate or oval-obovate.

Var. β, minor.

Leaves subrotund-obovate. A smaller plant than var. α, rarely more than 1 foot high. Leaves not exceeding $\frac{1}{2}$ to 1 inch in length.

In moist woods and in wet places, on heaths and commons. Plentiful, and generally distributed.

England, Scotland, Ireland. Shrub. Late Spring.

A bushy shrub, rarely more than 3 or 4 feet high, with numerous diffuse branches, the young ones soon becoming glabrous. Leaves similar to those of *S. cinerea*, var. *aquatica*, but smaller (rarely above 2 inches long, and often less), and much more rugose above. The stipules are usually larger, broader in proportion, and never absent on the later shoots. Catkins similar to those of *S. cinerea*, but smaller, rarely more than $\frac{1}{2}$ or $\frac{3}{4}$ inch long when in flower. Capsule considerably narrower than in *S. cinerea*; style shorter or altogether indiscernible; stigmas shorter and thicker.

Wrinkled-leaved Sallow.

French, *Saule ridé*. German, *Geohrte Weide*.

SPECIES XVIII.—**SALIX CAPREA.** *Lim.*

PLATES MCCCXXXI. MCCCXXXII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXVII.

Billot, Fl. Gall. et Germ. Exsicc. No. 462.

Wimmer, Sal. Europ. p. 55. *Anders.* Mon. Sal. p. 75. *Hook. & Arn.* Brit. Fl. ed. viii. p. 408. *Bab.* Man. Brit. Bot. ed. vi. p. 311.

Leaves oval or roundish-oval or elliptical, broadest near the middle, or a little beyond it, rounded or subcordate rarely wedgeshaped towards the base, shortly acuminate or cuspidate, undulated and usually crenate-serrate at the margins, which are very narrowly reflexed, but never revolute, even and at length glabrous and dull green above, grey and tomentose beneath, where they are pubescent with white hairs on the veins. Stipules subsessile, semicircular, half-reniform. Catkins opening before the leaf-buds, subsessile, with a few non-foliaceous bracts at the base; the male catkins ovate-oblong, the female at first oblong, afterwards cylindrical. Catkin-scales oblanceolate,

densely pilose. Stamens 2; filaments free, glabrous. Capsule subulate-conical, grey, silky-tomentose, on a stalk four to eight times as long as the nectary; style scarcely any; stigmas short, ovate, entire, or 2-cleft. Branches of the year finely pubescent, buds glabrous or subglabrous; leaves softly pubescent on both sides when young.

Var. α , *genuina*.

PLATE MCCCXXXI.

S. Caprea, *Sm.* Engl. Bot. ed. i. No. 1488, Engl. Fl. Vol. IV. p. 225.

Leaves undulated and crenate-serrate. Stipules conspicuous.

Var. β , *sphacelata*.

PLATE MCCCXXXII.

S. sphacelata, *Sm.* Engl. Bot. ed. i. No. 2333, Engl. Fl. Vol. IV. p. 224.

S. Silesiaca, *Willd.* var. β (?). *Wimm.* Sal. Europ. p. 62.

“Leaves entire” (Smith), discoloured at the point. Stipules often absent. Whole plant much smaller than in var. α .

In woods, pastures, hedgerows, &c. Very common, and generally distributed. Var. β at Fionlarig, near head of Loch Tay, Perthshire, (Rev. Dr. Stewart); and in valleys among the Highlands of Scotland (Lightfoot).

England, Scotland, Ireland. Tree or shrub. Early Spring.

A tree, when left to itself, attaining the height of 20 to 30 feet, with the leaves, when full-grown, 2 to 5 inches long, less narrowed towards the base than in *S. cinerea* or *S. aurita*, more softly downy on both sides when young, and permanently so beneath, and the pubescence beneath has a greater tendency to become slightly silky than in the two preceding. Male catkins 1 to $1\frac{1}{4}$ inch long, thicker than in any of the preceding species. Female at first about the size of the male, but at length attaining to $1\frac{1}{2}$ to 3 inches. Capsules about $\frac{1}{2}$ inch long. Catkin-scales fuscous at the apex as in the other species in this section.

This is one of the earliest flowering of the genus. Some of the forms approximate closely to those of *S. cinerea*, but that is a smaller shrub, with more rigid leaves, which are more attenuated at the base, duller green above, and with the veins more prominent beneath, and often dull orange. In *S. cinerea* the catkins are smaller; the anthers deeper yellow; the capsules smaller and more acute, and the young branches and even the buds more pubescent, the latter shorter.

S. aurita differs from *S. caprea* in its more ovate and rugose leaves, and much smaller catkins and capsules, which are always nearly white, not grey.

Specimens of *S. spacelata* show it to be only a small state of *S.*

caprea. Dr. Wimmer, in quoting it as possibly *S. Silesiaca*, appears to have seen no specimens, but to judge from the descriptions in Smith's "Flora Britannica."

Great Sallow.

French, *Saule marceau*. German, *Sohl oder Saal Weide*.

This species has several very valuable qualities. The bark serves the Highlanders for tanning, and is no indifferent substitute for cinchona bark in agues. The wood, being white, tough, and smooth in grain, forms excellent hurdles, and good handles for hatchets. It is also used for charcoal, and in the manufacture of gunpowder. The large golden yellow male catkins and the silver grey female ones deck the bare branches in the most beautiful manner, rendering the trees conspicuous in the early spring, and causing them to be the resort of bees in search of honey. In common with other early willows, the sallow is vulgarly called the "palm," and is used by the Roman Catholics of England in their Palm Sunday celebration:—

"In Rome, upon Palm Sunday,
They bear true palms;
The cardinals bow reverently,
And sing old psalms.
Elsewhere those psalms are sung
Beneath the olive branches;
The holly-bough supplies their place
Amid the avalanches."

More northern climes must be content, not exactly with "the sad willow," as the poet goes on to say, for that is the *Salix Babylonia*, or weeping willow—a plant not used in Roman Catholic celebrations—whereas this one which he intends is an emblem of hope and cheerfulness. It is doubtless the same tree as Rosalind found in the forest bearing the verses in praise of her—"a palm tree," as she calls it, according to Shakspeare.

GROUP II.—PHYLICIFOLIÆ.

Catkin-scales short, brown, fuscous at the apex. Capsule stalked; style long.

Shrubs, rarely trees, with the pubescence of the leaves not crisped or woolly.

SPECIES (?) XIX.—**SALIX LAURINA.** Sm.

PLATE MCCCXXXIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXIX. Fig. 2004.

Anders. Mon. Sal. p. 152. *Sm.* Trans. Linn. Soc. Vol. VI. p. 122. *Hook.* Brit. Fl. ed. iv. p. 368.

S. Caprea-Weigeliana, *Wimm.* Sal. Europ. p. 215.

S. bicolor, *Sm.* Engl. Bot. ed. i. No. 1806, and Engl. Fl. Vol. IV. p. 178.

Leaves, when they are thin and reddish, at length rather rigid or subcoriaceous, oval-oblong or oval-obovate, shortly acuminate or sub-

acute, callous-serrate, dull green, slightly shining, even and subglabrous or very thinly hairy above, glaucous and sparingly hairy or subglabrous beneath, and softly pubescent on both sides where they are silky on the veins. Stipules small, ovate, half-cordate, caducous. Male flowers unknown. Female catkins opening at the same time as the leaf-buds, shortly stalked or subsessile, with a few foliaceous bracts at the base, rather dense, cylindrical. Catkin-scales strapshaped, obtuse, thinly pilose. Capsule subulate-conical, whitish silky-tomentose, on a stalk three or four times as long as the nectary; style elongate, commonly exceeding the stigmas; stigmas short, ovate, generally 2-cleft. Branches of the year and buds finely downy, soon becoming glabrous; leaves sometimes hairy, blackish in drying, but only if gathered young.

In woods and thickets. Rather rare. Smith states, on the authority of Mr. Crowe, that it is not uncommon in Norfolk. It occurs in the Isle of Wight, by a little pool close to Newtown, on the right hand of the road from Shalfleet between the Town Hall and Fretland's farm; perhaps also in a hedge by the side of a horse path from Alveston to Nunworth Down (Dr. Bromfield); Bryanston, Dorset (Mr. I. C. Mansel); Richmond, Yorkshire (Mr. J. Ward in *Leefe*, Sal. Brit. No. 43). Probably it occurs elsewhere, but it has been so much confounded with forms of *S. phlyicifolia* that I cannot give its correct distribution in England, and I have no reliable record of it from Scotland. In Ireland, where it is a doubtful native, it occurs near Carrigline in a moist bushy place by the roadside between Castle Dawson and Bellaghy, co. Derry, also on the shore of Lough Neagh, near Massarene Park, Antrim.

England, Ireland. Shrub or tree. Late Spring or early Summer.

A bush rarely above 6 feet high, but when left to itself sometimes reaching 20 or 30 feet in height, with upright virgate mahogany coloured branches and numerous nearly upright leaves. Leaves from 2 to 4 inches long, widest a little beyond the middle, where they are 1 to 2 inches across, when young resembling those of *S. Caprea*, but with the hairs rather more silky, when full-grown, however, they are much more like those of *S. phlyicifolia*. Catkins numerous, suberect, 1 to 1½ inch long, with the scales much shorter than the ovaries, which are white.

This is well distinguished from all the forms of *S. Caprea*, *S. cinerea*, and *S. aurita* by the elongate style and later period of flowering, the hairs are also more silky and less crisped, and the mature leaves are more rigid, brighter green above, and more glaucous beneath, and the capsule has a shorter stalk, and the catkin-scales are shorter in proportion.

From *S. phylicifolia* it differs in its larger size, its larger darker green and less shining suberect leaves, with the veins more elevated and more hairy beneath, in the catkins being more numerous on each branch, and in the capsule being densely silky-woolly with white hairs, on a longer stalk, but with a shorter style

Intermediate Sallow.

SPECIES XX.—**SALIX PHYLICIFOLIA.** "*Linm.*" *Fries.*

PLATES MCCCXXXIV. MCCCXLVI.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXIII. Fig. 2002.

Anders. Mon. Sal. p. 131. Bab. Man. Brit. Bot. ed. vi. p. 312. Hook. & Arn. Brit. Fl. ed. viii. p. 410.

S. Weigeliana, Willd., Wimm. Sal. Europ. p. 76.

Leaves at length somewhat rigid or subcoriaceous, oval or oblanceolate-oval, or elliptical, or oblong-obovate or oblanceolate, shortly acuminate or acute, often undulated and crenate-serrate or faintly callous-serrate, rarely entire, green, very glossy, even and glabrous above, more or less glaucous and glabrous beneath, where the primary veins are slightly elevated, and sometimes silky hairy. Stipules very small, ovate or lanceolate, half-heartshaped, often absent. Catkins opening at the same time as the leaf-buds, subsessile, or the female ones rather shortly stalked, and generally with a few foliaceous bracts at the base, ovoid or cylindrical, dense, or (in fruit) lax. Catkin-scales strapshaped, subacute, thinly pilose, rarely densely woolly. Stamens 2; filaments free, glabrous. Capsule lanceolate-conical, often grey or white, silky-tomentose or subglabrous, on a stalk 2 or 3 times as long as the nectary; style elongate, equalling or exceeding the stigmas; stigmas short, oblong 2-cleft. Branches of the year finely and sparingly downy, very soon becoming glabrous; leaves sometimes turning black in drying, but only if gathered when young, when they are thin, green, and sparingly hairy on both sides, or glabrous above.

Var. α, radicans.

PLATE MCCCXXXIV.

S. radicans, Sm. Brit. Fl. Vol. III. p. 1053. Hook. Brit. Fl. ed. iv. p. 368.

S. phylicifolia, Sm. Engl. Bot. ed. i. No. 958. Engl. Fl. Vol. IV. p. 173.

Lower branches decumbent and rooting. Leaves elliptical-oblanceolate, acute. Capsule and stalk silky. Style long.

Var. β , *Davalliana*.

PLATE MCCCXXXV.

S. Davalliana, *Sm.* Engl. Fl. Vol. IV. p. 175. *Borrer*, in Eng. Bot. Suppl. No. 2701. *Hook.* Brit. Fl. Vol. IV. p. 369.

Upright leaves oblong-oblanccolate, acuminate. Capsule and stalk silky; style rather long.

Var. γ , *Weigeliana*.

PLATE MCCCXXXVI.

S. Weigeliana, "*Willd.*" *Borrer*, in Eng. Bot. Suppl. No. 2656. *Hook.* Brit. Fl. ed. iv. p. 369.

S. Wulfeniana, *Sm.* Engl. Fl. Vol. IV. p. 176 (non *Willd.*).

S. livida, *Wahl.* (?). *Wimm.* Sal. Europ. p. 110.

Upright. Leaves roundish-oval or broadly rhomboidal-oval, acute, or shortly acuminate. Capsule and stalk silky; style long.

Var. δ , *nitens*.

PLATE MCCCXXXVII.

S. nitens, *G. Anders.* MS. *Sm.* Engl. Fl. Vol. IV. p. 175. *Borrer*, in Eng. Bot. Suppl. No. 2655. *Hook.* Brit. Fl. ed. iv. p. 370.

Upright. Leaves oval or oval-oblanccolate, acute. Capsule and stalk silky; style long.

Var. ϵ , *Croweäna*.

PLATE MCCCXXXVIII.

S. Croweäna, *Sm.* Trans. of Linn. Soc. Vol. VI. p. 117. Eng. Bot. No. 1146, and Eng. Fl. Vol. IV. p. 192.

Upright. Leaves elliptical or elliptical-oblanccolate, acute. Stamens often monadelphous. Capsule and stalk "downy." (*Sm.*); style rather long.

Var. ζ , *Dicksoniana*.

PLATE MCCCXXXIX.

S. Dicksoniana, *Sm.* Engl. Bot. ed. i. No. 1390, and Eng. Fl. Vol. IV. p. 196. *Hook.* Brit. Fl. ed. iv. p. 371.

S. myrtilloides, *Sm.* Brit. Fl. Vol. III. p. 1056 (non *Linn.*)

Upright. Leaves oval or oval-elliptical, acute. Capsule and stalk silky; style short.

Var. η , *tenuior*.

PLATE MCCCXL.

S. tenuior, *Borrer*, in Engl. Bot. Suppl. No. 2650. *Hook.* Brit. Fl. ed. iv. p. 368.

S. laurina, var. *Hook.* & *Arn.* Brit. Fl. ed. viii. p. 409. *Bab. Man.* Brit. Bot. ed. vi. p. 312.

Upright. Leaves oblanceolate, acuminate. Capsule and stalk silky; style long.

Var. θ , *laxiflora*.

PLATE MCCCXLI.

S. laxiflora, *G. Anders.* MS. *Borrer*, in Engl. Bot. Suppl. No. 2749, and *Hook.* Brit. Fl. ed. iv. p. 368.

Upright. Leaves obovate or oval-obovate, abruptly acuminate. Capsule glabrous below, downy at the apex; stalk glabrous; style long.

Var. ι , *propinqua*.

PLATE MCCCXLII.

S. propinqua, *Borrer*, Engl. Bot. Suppl. No. 2729. *Hook.* Brit. Fl. ed. iv. p. 368.

S. nigricans, var. *propinqua*, *Hook.* & *Arn.* Brit. Fl. ed. viii. p. 409.

S. laurina, var. *propinqua*, *Bab. Man.* Brit. Bot. ed. vi. p. 312.

Upright. Leaves elliptical or oblong-elliptical, abruptly acuminate below. Capsule silky towards the apex; style long.

Var. κ , *tetrapla*.

PLATE MCCCXLIII.

S. tetrapla, "*Walker.*" *Sm.* Engl. Fl. Vol. IV. p. 177. *Borrer*, in Engl. Bot. Suppl. No. 2702. *Hook.* Brit. Fl. ed. iv. p. 369.

S. nigricans-Weigeliana, *Wimmer.* Sal. Europ. p. 217.

S. phycifolia-nigricans, *Wimmer.* Denkschr. d. Schles. Gesellsch. p. 168.

Upright. Leaves oblong-oblanceolate, acuminate. Capsule glabrous at the base, downy at the apex; stalk glabrous; style long.

Var. λ , *Borreriana*.

PLATE MCCCXLIV.

S. Borreriana, *Sm.* Engl. Fl. Vol. IV. p. 174. *Borrer*, in Engl. Bot. Suppl. No. 2619. *Hook.* Brit. Fl. ed. iv. p. 369.

Erect. Leaves narrowly oblanceolate, longly acuminate. Capsule and stalk glabrous; style long.

Var. μ , *phillyreifolia*.

PLATE MCCCXLV.

S. phillyreifolia, *Borrer*, in Engl. Bot. Suppl. No. 2660. *Hook. Brit. Fl. ed. iv.* p. 371.

Upright. Leaves broadly-elliptical or rhombic-elliptical, acute. Capsule and stalk glabrous; style rather long.

Var. ν , *tenuifolia*.

PLATE MCCCXLVI.

S. tenuifolia, *Sm. Brit. Fl. Vol. III.* p. 1052, and *Engl. Fl. Vol. IV.* p. 179 (non *Engl. Bot. No. 2186*). *Borrer*, in *Engl. Bot. Suppl. No. 2795.* *Hook. Brit. Fl. ed. p. iv.* 371.

S. laurina, var. *tenuifolia*, *Hook. & Arn. Brit. Fl. ed. viii.* p. 409. *Bab. Man. Brit. Bot. ed. p. vi.* 312.

S. maialis, *Wahl. (?) Wimm. Sal. Europ.* p. 268.

Upright. Leaves oval or rhombic-elliptical, acute. Capsule and stalk glabrous.

By the sides of streams and on damp rocks. Common in the north of England and in Scotland; rare in the south. The var. *Croweäna* is said to grow in Norfolk, but whether it be really wild there I have no means of knowing. The neighbourhood of Richmond, Yorkshire, and the Breadalbane Mountains, Perthshire, are the two places from whence the greatest number of forms has been reported, very probably because these localities have been carefully explored by botanists who have paid special attention to willows.

England, Scotland, Ireland. Shrub. Late Spring, and often again in the end of Summer.

A polymorphous species, sometimes only a foot or two high, sometimes 6 to 12 feet. The branches are fuscous or dull purple, shining and glabrous, sometimes pubescent when young. The leaves, when mature, are more or less rigid, glabrous, and shining, with a somewhat greasy lustre above, with the veins scarcely at all impressed, more or less glaucous beneath; when young they are more or less membranous, and somewhat hairy, especially beneath; their size varies from 1 to 2 or even 3 inches in length, and their breadth, and even their shape, is extremely variable; the margin is generally more or less undulated or serrate, but sometimes entire. The stipules are rarely present, and always small, lanceolate or ovate, half-cordate or half-sagittate. The catkins are later in appearing than in most of the willows; the male about 1 inch long; the female often 2 inches or more, and frequently becoming lax in fruit. The catkin-scales are black at the

point, hairy or shaggy. Capsule generally olive or reddish-brown, though this colour is sometimes obscured by the grey or whitish pubescence.

From *S. laurina* it differs in being a smaller plant, with the branches making a greater angle with each other, the leaves less upright, smaller, more shining above, with the veins less elevated and less hairy beneath, the capsules much less woolly on shorter stalks and with longer styles. The young branches and leaves in the forms of *S. phylicifolia*, which have these hairy, become glabrous much sooner than in *S. laurina*.

Some of the varieties, as *tetrapla* and *propinqua*, are very probably hybrids between *S. phylicifolia* and *S. nigricans*; if not, these two should perhaps be included under one superspecies, as has been done by Mr. Benthams in his "Handbook of the British Flora."

Tea-leaved Sallow.

French, *Saule philica*. German, *Zweifarbige Weide*.

Mr. Loudon says, "This *Salix*, when covered with male blossoms, is amongst the most handsome, nor are the leaves destitute of beauty."

SPECIES XXI.—**SALIX NIGRICANS.** "*Sm.*," *Fries.*

PLATES MCCCXLVII.—MCCCLIV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXXIII. fig. 2117.

Billot. Fl. Gall. et Germ. Exsicc. No. 1960.

Anders. Mon. Sal. p. 125. *Wimm.* Sal. Europ. p. 70. *Bab.* Man. Brit. Bot. ed. vi. p. 312. *Hook. & Arn.* Brit. Fl. ed. viii. p. 408.

S. phylicifolia, var. β , *Linn.* Spec. Plant, p. 1442. *Benth.* Handbk. Brit. Fl. ed. ii. p. 426.

Leaves at length firm, but not rigid or coriaceous, oval or oblong-oval or oblong-obovate or elliptical or oblanceolate, shortly acuminate or acute, often undulated and crenate-serrate or faintly callous-serrate, rarely entire, green, slightly glossy, rugose and usually subglabrous above, paler or slightly glaucous and subglabrous beneath, where the primary veins are much elevated, and often silky-hairy. Stipules conspicuous, ovate, half-heartshaped, generally present. Catkins opening at the same time as the leaf-buds, subsessile, or the female ones rather shortly stalked, and with a few foliaceous bracts or leaves at the base, ovoid or cylindrical, dense, or rather lax in fruit. Catkin-scales strap-shaped, subacute or obtuse, pilose. Stamens 2; filaments free, pilose at the base. Capsule conical-subulate, glabrous or slightly tomentose, on a stalk four to eight times as long as the nectary; style elongate, usually equalling the stigmas; stigmas short, oblong, usually 2-cleft. Branches of the year downy; leaves turning black in drying when

gathered young, and often even when mature, thin and usually pubescent on both sides when young.

Var. α , *genuina*.

PLATE MCCCXLVII.

S. nigricans, *Sm.* Engl. Bot. ed. i. p. 1213, and Engl. Fl. Vol. IV. p. 172. *Hook.* Brit. Fl. ed. iv. p. 366.

Upright. Leaves oblong-elliptical, shortly acuminate, glaucous, and nearly glabrous beneath. Capsule and stalk silky.

Var. β , *cotonifolia*.

PLATE MCCCXLVIII.

S. cotonifolia, *Sm.* Engl. Bot. ed. i. No. 1403, and Engl. Fl. Vol. IV. p. 220. *Hook.* Brit. Fl. ed. iv. p. 366.

Upright. Leaves oval or orbicular, oval, with a broad short point, pale or slightly glaucous, and downy beneath. Capsule and stalk silky.

Var. γ , *Forsteriana*.

PLATE MCCCXLIX.

S. Forsteriana, *Sm.* Engl. Bot. ed. i. No. 2344, and Engl. Fl. Vol. IV. p. 244. *Hook.* Brit. Fl. ed. iv. p. 367.

Upright. Leaves oval-obovate or elliptical-obovate, abruptly acuminate, glaucous, and slightly downy on both sides. Capsule and stalk hairy.

Var. δ , *rupestris*.

PLATE MCCCCLI.

S. rupestris, *Sm.* Engl. Bot. ed. i. No. 2342, Engl. Fl. Vol. IV. p. 222. *Hook.* Brit. Fl. ed. iv. p. 367.

Trailing. Leaves elliptical-obovate, acute, pale beneath, and sparingly hairy on both sides. Capsule and stalk pubescent—"silky" (*Smith*).

Var. ϵ , *Andersoniana*.

PLATE MCCCCLI.

S. Andersoniana, *Sm.* Engl. Bot. ed. i. No. 2343, and Engl. Fl. Vol. IV. p. 223. *Hook.* Brit. Fl. ed. iv. p. 366.

Upright. Leaves elliptical, slightly acuminate, glaucous beneath, thinly hairy on both sides. Capsule glabrous, not wrinkled, stalk downy.

Var. ζ, *Damascena*.

PLATE MCCCLII.

S. Damascena, "*Forbes*." *Borrer* in Engl. Bot. Suppl. No. 2709. *Hook.* Brit. Fl. ed. iv. p. 376.

Upright. Leaves rhomboidal-oval or oval-acute, green, and thinly hairy beneath, nearly glabrous above. Capsule glabrous, not wrinkled, stalk hairy.

Var. η, *petræa*.

PLATE MCCCLIII.

S. petræa, *G. Anders.* *Borrer* in Engl. Bot. Suppl. No. 2725. *Hook.* Brit. Fl. ed. iv. p. 367.

Erect. Leaves oblong or oblong-elliptical, acute, keeled, scarcely glaucous beneath, thinly hairy on both sides, especially beneath. Capsule glabrous, wrinkled towards the apex, stalk hairy.

Var. θ, *hirta*.

PLATE MCCCLIV.

S. hirta, *Sm.* Engl. Bot. ed. i. No. 1404, and Engl. Fl. Vol. IV. p. 221. *Hook.* Brit. Fl. ed. iv. p. 366.

Upright, subarborescent. Leaves oblong or oval-oblong, acuminate, abrupt, or subcordate at the base, subglaucous beneath, thinly hairy on both sides. Capsule glabrous, wrinkled towards the apex.* Stalk hairy. Young branches very densely hairy.

Var. ι, *floribunda*.

PLATE MCCCLIV. (*bis*).

S. floribunda, *Forbes*, in *Salict. Wob.* p. 107.

S. tenuifolia, *Sm.* Engl. Bot. ed. i. No. 2186 (non Brit. Fl.).

S. bicolor, *Hook.* Brit. Fl. Vol. IV. p. 370 (non *Ehrh.* nec *Sm.*).

Leaves oblong-oval, shortly acuminate, rounded at the base, glaucous beneath, thinly hairy on both sides. Female catkins unknown.

By the sides of streams, and in wet meadows. Rare in the low country, but common in mountainous districts, both in the north of England and in Scotland. The var. α was observed by Mr. Crowe at Wrongay Fen, Norfolk; at Shobden Court, Herefordshire; and in

* This description is taken from a plant cultivated at Kew, under the name of *S. hirta*. The Rev. J. E. Leece describes the capsule as hairy, and Dr. Walker-Arnott says they are not wrinkled near the apex.

osier-beds in many places; this is the only form I know of occurring so far south. Local in Ireland.

England, Scotland, Ireland. Shrub. Late Spring and early Summer; sometimes again in late Summer.

S. nigricans is as variable a plant as *S. phylicifolia*, and runs through nearly a parallel series of variations. It is sometimes only 1 foot high, at other times 10 or 12 feet. The leaves also vary much, both in form and size, being sometimes little more than 1 inch long, at others 2 or 3 inches, or even more. The points in which it differs from *S. phylicifolia* are the thinner texture of the leaves, which have the veins more impressed above and more prominent beneath, their colour darker above and less intensely glaucous beneath, both sides often retaining their hairiness for a longer period; the young branches and young leaves are more thickly pubescent; the stipules are more often present, and always larger; the leaves, especially when young, have a greater tendency to turn black in drying; the capsule is more often glabrous, with a shorter style and longer pedicel.

S. floribunda (*Forbes*) is a doubtful plant, of which the female seems to be unknown, but the thin hairy leaves and large stipules indicate that it is a form of *S. nigricans* rather than of *S. phylicifolia*, to which Dr. Walker-Arnott is inclined to refer it.

Dark-leaved Sallow.

French, *Saule noirissant*. German, *Schwarzwerdende Weide*.

GROUP III.—INCUBACÆ. *Linn.*

Style short; stipules linear.

Small shrubs, with the pubescence of the leaves usually silky.

SPECIES (?) XXIII.—**SALIX AMBIGUA.** *Ehrh.*

PLATE MCCCLV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXCII. Fig. 1243, b, and 1243, c.

Anders. Mon. Sal. p. 117. Borrer, in Engl. Bot. Suppl. No. 2733. Hook. Brit. Fl. ed. iv. p. 361. Hook. & Arn. Brit. Fl. ed. viii. p. 404. Bab. Man. Brit. Bot. ed. vi. p. 314.

S. aurita-repens, Wimm. Sal. Europ. p. 233.

Leaves oblong-obovate or -oblanceolate or -oval or -elliptical, with a short recurved point, faintly crenate-serrate or serrate, sometimes nearly entire, rugose, from the veins being impressed above and prominent beneath, dark green, shining and subglabrous, or grey or hoary and pubescent above; subglabrous and glaucous or more often clothed with silky or cottony hairs beneath. Stipules small, subsessile,

ovate or half-cordate. Catkins opening before the leaf-buds, shortly stalked or subsessile, with a few small silky leaves on the stalk, oblong-cylindrical, dense, but becoming rather lax in fruit. Catkin-scales oblong or obovate, thinly silky-pilose. Stamens 2; filaments free, pubescent. Capsule conical-subulate, grey-silky, on a stalk 4 or 5 times as long as the nectary; style scarcely any; stigmas short, thick, at length cleft. Young branches and buds pubescent, soon becoming glabrous; leaves pubescent with soft hairs when young.

Var. α , *genuina*.

Leaves oblong-oval or oblong-obovate, slightly hairy.

Var. β , *major*.

S. versifolia, "Ser. S. p. 40," *Borrer*.

Leaves oblong-obovate, larger than those of var. α , silky on both

Var. γ , *spathulata*.

S. spathulata, *Willd. Spec. Pl. Vol. IV. p. 700*.

Leaves oblong-oblongeolate, slightly silky-hairy.

Var. δ , *undulata*.

Leaves oblong-elliptical, slightly hairy. Stipules more distinctly stalked, and style longer than in the other vars.

On gravelly heaths. Rather rare, but widely distributed. Var. α , Sussex, Perth; Epping Forest, Essex; Hopton, Suffolk; Aberdeen; Inverness; Forfar; Caithness; Orkney; and the Isle of Staffa. Var. β , Hopton, Suffolk; Restennet Moss, near Forfar (now lost by drainage). Var. γ , Epping Forest; Hopton, Suffolk; and between Balnagard and Aberfeldie, Perth. Var. δ , Hopton, Suffolk. Some of the forms occur on the north-west side of Ben Buben, Sligo, and on hills near Belfast, but I have not seen Irish specimens.

England, Scotland, Ireland. Shrub. Late Spring.

A small much-branched shrub, rarely more than 1 to 3 feet high, with ascending or procumbent branches. Leaves generally about 1 inch long, rarely attaining to 2 inches, very similar to those of *S. aurita*, between which and *S. repens* it is no doubt a hybrid. From *S. aurita* it differs in its smaller size, more rigid, less rugose, flatter and less serrated leaves, smaller stipules, and more silky pubescence. From *S. repens* it is distinguished by its more rugose leaves, less silky

pubescence, conspicuous stipules, shorter style and stigmas, and more bushy growth.

Ambiguous Sallow.

French, *Saule ambiguë*. German, *Zweifelhafte Weide*.

SPECIES XXIV.—**SALIX REPENS.** *Linn. Auct.*

PLATES MCCCLVI. to MCCCLXII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. DLXXXIX. DXC. and DXCI. Figs. 1239 to 1243.

Billot, Fl. Gall. et Germ. Exsicc. No. 1959.

Wimm. Sal. Europ. p. 114. *Anders.* Mon. Sal. p. 113. *Bab.* Man. Brit. Bot. ed. vi. p. 313.

S. fusca, *Hook.* Brit. Fl. ed. iv. p. 361. *Hook. & Arn.* Brit. Fl. ed. viii. p. 403.

Leaves oblong-oval or oblong-elliptical or elliptical or oval, acute or subacute, entire or very faintly serrate, with the margins narrowly reflexed, even, reticulated, with the veins slightly prominent on both surfaces, bright green, shining and glabrous or more or less grey and silvery-silky above, glaucous and more or less thickly clothed with adpressed silky hairs beneath, or rarely glabrous when full grown. Stipules usually absent, but on vigorous barren shoots lanceolate. Catkins opening at the same time as the leaf-buds, or before them, subsessile or shortly stalked, with a few leaves at the base, oval-oblong, dense. Catkin-scales strapshaped or oblanceolate. Stamens 2; filaments free, glabrous. Capsule lanceolate-conical, grey with silky pubescence or glabrous, on a stalk 2 or 3 times as long as the nectary; style short; stigmas ovate, short, thick, entire or cleft. Young branches and buds more or less silky, young leaves silky-white.

Var. α , *genuina*.

PLATE MCCCLVI.

S. repens, *Linn.* *Sm.* Engl. Bot. ed. i. No. 183, and Engl. Fl. Vol. IV. p. 209.

Stem much branched, decumbent below; flowering branches ascending. Leaves elliptical, with a straight point, entire, nearly glabrous above, glaucous and silky beneath. Stipules none. Capsule glabrous. Flowers with the young leaves.

Var. β , *fusca*.

PLATE MCCCLVII.

S. fusca, *Linn.* *Sm.* Engl. Bot. ed. i. No. 1960, and Engl. Fl. Vol. IV. p. 210.

Stem suberect, much branched; branches short, spreading. Leaves

elliptical oblong with a straight point faintly serrate, nearly glabrous above, glaucous and silky beneath. Stipules none. Capsule glabrous. Flowers with the young leaves.

Var. γ , *prostrata*.

PLATE MCCCLVIII.

S. prostrata, *Sm. Engl. Bot. ed. i. No. 1959*, and *Engl. Fl. Vol. IV. p. 211*.

Stem prostrate, much branched; branches long, slender, spreading, and a few of them short and suberect. Leaves elliptical, with a twisted point, faintly serrate, obscurely downy above, glaucous and silky beneath, at least when young. Stipules absent or minute. Capsule silky. Flowers before the leaves.

Var. δ , *ascendens*.

PLATE MCCCLIX.

S. ascendens, *Sm. Engl. Bot. ed. i. No. 1962*.

S. foetida, var. α , *ascendens*, *Sm. Engl. Fl. Vol. IV. p. 208*.

Stem decumbent; branches long, ascending. Leaves elliptical, with recurved points, faintly serrate, subglabrous above, glaucous and silvery-silky beneath. Stipules often present, lanceolate or ovate. Capsule silky, becoming glabrous as it ripens. Flowers with the leaves.

Var. ϵ , *parvifolia*.

PLATE MCCCLX.

S. parvifolia, *Sm. Engl. Bot. ed. i. No. 1961*.

S. foetida, var. β , *parvifolia*, *Sm. Engl. Fl. Vol. IV. p. 208*.

Stem decumbent, much branched; branches long, spreading or procumbent. Leaves oval, with recurved points, nearly entire, subglabrous above, glaucous and more or less silvery-silky beneath. Stipules usually present, small, ovate. Capsule silky, becoming glabrous as it ripens. Flowers with the leaves.

Var. ζ , *incubacea*.

PLATE MCCCLXI.

S. incubacea, "*Limn.*," *Sm. Engl. Fl. Vol. IV. p. 212*. *Bor. in Engl. Bot. Suppl. No. 2600*.

Stem procumbent or erect; branches very long, erect. Leaves oblong or oblong-elliptical, with a twisted point, glabrous and strongly reticulated, with prominent veins above, glaucous and silvery silky

beneath, but at length glabrous. Capsule silky, at length glabrous
Flowers with the young leaves.

Var. η , *argentea*.

PLATE MCCCCLXII.

S. argentea, *Linn. Sm. Engl. Fl. ed. i. No. 1364*, and *Engl. Fl. Vol. IV. p. 206*.

Stem upright, dividing into numerous very long, simple, erect branches. Leaves oval or oblong-oval, entire, with a recurved point, silky, but at length nearly glabrous above, silvery-silky beneath. Capsule silky. Flowers with the young leaves. A larger plant than any of the preceding vars.

In damp places, on heaths and commons. Abundant, and universally distributed. Var. *argentea* in sandy places.

England, Scotland, Ireland. Shrub. Late Spring, early Summer, and sometimes again in Autumn.

A very variable plant, the branches in some of the forms being only a few inches long, in others 2 or 4 feet or more; the leaves also vary much in outline and length, being from $\frac{1}{2}$ to $1\frac{1}{2}$ inch long, but distinguished by their silvery-silky pubescence when young, some remains of which is usually discernible on the underside of even the adult leaves, which are somewhat firm, and reticulated with veins which become prominent both above and below when the plant is dried. The catkins are $\frac{1}{2}$ to 1 inch long in fruit, sometimes with stalk elongated and with leaves, at other times with it extremely short, and with subfoliaceous bracts. The catkin-scales are variable in colour, often purplish, and more or less distinctly fuscous at the apex. The anthers are yellow, turning fuscous after the pollen is shed. The capsule is sometimes grey with silky hairs, which are very often deciduous as it ripens, at other times it is nearly glabrous even in its earliest stage.

Dwarf Willow.

French, *Saule rampant*. German, *Kriechende Weide*.

SPECIES (?) XXV.—**SALIX ROSMARINIFOLIA.** "*Linn.*" Koch.

PLATES MCCCCLXIII. MCCCCLXIV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXCI. Fig. 1242.

Anders. Mon. Sal. p. 115.

S. repens, var. *rosmarinifolia*, *Wimm. Sal. Europ. p. 117.*

Leaves strapshaped-elliptical, attenuated at both ends, acute, entire, or very faintly serrate, with the margins narrowly reflexed, even, and faintly reticulated, dull green, shining and glabrous above, glaucous

and commonly more or less thickly clothed with adpressed silky hairs beneath, or rarely glabrous when full-grown. Stipules minute, lanceolate, often absent. Catkins opening at the same time as the leaf-buds, subsessile or shortly stalked, with a few leaves at the base, broadly ovate or subglobular-ovate, dense. Catkin-scales obovate. Stamens 2; filaments free, glabrous. Capsule lanceolate- or ovate-conical, grey with silky pubescence, on a stalk two or three times as long as the nectary; style very short; stigmas ovate, short, thick, cleft or entire. Young branches and buds silky white; young leaves more or less silky.

Var. α , *genuina*.

PLATE MCCCLXIII.

S. rosmarinifolia, *Sm.* Engl. Bot. ed. i. No. 1365, and Engl. Fl. Vol. IV. p. 214. *Hook.* Brit. Fl. ed. iv. p. 360. *Hook. & Arn.* Brit. Fl. ed. viii. p. 402. *Bab. Man. Brit. Bot.* ed. vi. p. 313.

Catkins frequently curved when young. Catkin-scales short, hairy. Capsule lanceolate-conical; stigmas cleft.

Var. β , *angustifolia*.*

PLATE MCCCLXIV.

S. angustifolia, *Wulf.* *Hook.* Brit. Fl. ed. iv. p. 360. *Hook. & Arn.* Brit. Fl. ed. viii. p. 403. *Bab. Man. Brit. Bot.* ed. vi. p. 313.
S. Arbuscula, *Sm.* Engl. Bot. ed. i. No. 1366, and Engl. Fl. Vol. IV. p. 197 (non *Linn.*).

Catkins erect, straight. Catkin-scales nearly as long as the young germens, woolly. Capsule ovate-conical; stigmas entire.

In spongy bogs, but very doubtfully native. Var. α is said by Dillenius to have been found in England by Sherrard, and sent to Crowe by Dickson, who is presumed to have found it in the Highlands of Scotland. Var. β is said to have been gathered in the Highlands of Scotland by Mr. Dickson; it is also alleged to have occurred in the Clova Mountains, and on the banks of the Nith, twenty miles above Dumfries.

[England? Scotland?] Shrub. Late Spring.

A small shrub, 2 to 4 feet high, with long straight fuscous or testaceous erect or ascending branches. The leaves are 1 to 2 inches long, and rarely more than $\frac{1}{3}$ inch broad; the catkins from $\frac{1}{4}$ to $\frac{1}{2}$ inch long. The long leaves and short catkins are the only points which

* Erroneously named *argentifolia* on the plate.

separate it from *S. repens*, of which it is probably merely a variety, as Dr. Wimmer considers it. The large leaves given on the original plate, Engl. Bot. ed. i. 1366, have clearly nothing to do with the plant figured.

Wimmer refers the *S. rosmarinifolia* of "English Botany, 1365," to *S. viminalis-repens*, *Lasch.*, which he considers the true *rosmarinifolia* of Linnæus. This is the *S. Friesiana* of Anderson. It differs from our plant in its narrower leaves, with the margins more revolute when young; it has also longer oblong catkins, subsessile capsules, and, according to Anderson, a more or less evident style, though Wimmer describes a form with the style obliterated.

Rosemary-leaved Willow.

French, *Saule à feuilles de Rosmarin.* German, *Rosmarinblättrige Weide.*

GROUP IV.—CHRYSANTHÆ.

Capsule more or less compressed, sessile; style long; stigmas entire.

Shrubs with strigose-pilose branches and broad woolly leaves, or trees with purple pruinose branches, and leaves like those of *S. alba* or *S. undulata*, but differing from these species by their sessile catkins, black-tipped catkin-scales, and 2 stamens.

SPECIES XXVII.—**SALIX ACUTIFOLIA.** *Willd.*

PLATE MCCCLXVI.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DCIII. Fig. 1255.

Hook. & Arn. Brit. Fl. ed. viii. p. 400. Bab. Man. Brit. Bot. ed. vi. p. 315.

S. pruinosa, "*Wendland.*" *Reich. Fl. Excurs. p. 1046. Wimm. Sal. Europ. p. 9.*

S. violacea, Andr. Bot. Rep. Vol. IX. No. 581.

Branches flaccid, violet, with a pruinose bloom, glabrous. Leaves narrowly elliptical-strapshaped or linear-elliptical, wedgeshaped at the base, longly acuminate and very acute, very finely callous-serrate, glabrous and green on both sides, but paler beneath, reticulate-veined when dry. Stipules lanceolate, acuminate. Catkins appearing before the leaves, sessile, without leaves at the base, oval-oblong, dense. Catkin-scales triangular, acuminate, very acute, dense, pilose, with very long straight white silky hairs. Stamens 2; filaments free, glabrous. "Capsule ovate-conical, glabrous, sessile; style elongate; stigmas linear-oblong." (*Koch.*) Young branches and leaves glabrous; the latter with minute white dots on the upper side.

In woods, and by the sides of streams. Very rare, and perhaps not native. "Found by Mr. Ward in 1831 at Broadhams, near Mensley,

a single bush only, which is now eradicated. More recently it has been met with by Mr. Mudd in Airyholme Wood, and in two or three places by the Leven side near Great Ayton, but only in very small quantities in each station." (*Baker*, "North Yorkshire.")

England (?). Tree. Early Spring.

A tree rarely above 10 or 12 feet high, much branched, with slender virgate and frequently drooping branches. Leaves 3 to 6 inches long, very similar in shape to those of *S. undulata*, but more acute and not so firm in texture, quite glabrous. Stipules callous-serrate. Male catkins 1 to 1½ inch long, very thick and very densely silky from the long hairs which adorn the black pointed catkin-scales. The female catkins I have not seen.

Wimmer appears to consider this a species originally from Eastern Europe or Asia.

Violet Willow.

German, *Spitzblättrige Weide.*

SPECIES XXVIII.—**SALIX LANATA.** *Linn.*

PLATE MCCCLXVII.

Wimm. Sal. Europ. p. 2. *Hook.* in Engl. Bot. Suppl. No. 2624. *Sm.* Engl. Fl. Vol. IV. p. 205. *Hook. & Arn.* Brit. Fl. ed. viii. p. 413. *Bab. Man.* Brit. Bot. ed. vi. p. 315.

Leaves oval or suborbicular or elliptical-obovate, rounded or subcordate at the base, abruptly pointed or very shortly acuminate, entire or repand, grey with woolly hairs above, glaucous and pilose on the veins beneath, reticulate-veined when dry. Stipules generally present, large, obliquely ovate, half-cordate, subacute, deciduous. Catkins appearing with the young leaves, sessile near the extremities of the branches, with a few subfoliaceous bracts at the base, cylindrical, very long, dense. Catkin-scales oblong, obtuse, very densely pilose with very long straight golden hairs turning to white. Stamens 2; filaments free, glabrous. Capsule conical-subulate, subcompressed, glabrous, on a stalk not exceeding the nectary in length; style long, exceeding the stigmas; stigmas oblong, notched or 2-cleft. Young branches and buds woolly, soon becoming glabrous; young leaves woolly on both sides, the hairs yellow, soon turning white.

On wet rocks. Rare. Clova Mountains, Forfarshire; Corrie of Loch Keander, Glencallater, Aberdeen; Maol Cuachlar, 8 miles west of Killin, Perth.

Scotland. Shrub. Late Spring, early Summer.

A small shrub 2 to 4 feet high, with numerous thick tortuous knotted branches. Leaves 1 to 2 inches long, variable in form. Catkins few, produced from very large brown strigosely-hairy buds near the apex of the branches, the hairs falling off before the catkin emerges. The male catkins are 1 to 2 inches long; the female at length 2 to 4 inches long, with blackish scales completely hidden by the very long canary-coloured hairs, which, however, in the female catkins soon fade to dull white after flowering.

Woolly Broad-leaved Willow.

GROUP V.—DAPHNOIDEÆ.

Capsule subsessile; style long; stigma bifid.

Small shrubs with the catkins subsessile or shortly stalked, bracteate at the base.

SPECIES XXIX.—**SALIX LAPPONUM.** *Linn.*

PLATES MCCCLXVIII.—MCCCLXX.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLXXII. Fig. 2016.

Wimm. Sal. Europ. p. 38. Bab. Man. Brit. Bot. ed. vi. p. 314.

S. arenaria, Linn. (ex parte). Hook. & Arn. Brit. Fl. ed. viii. p. 405.

Leaves oblong-oval or lanceolate or oblanceolate or obovate-oblong, rounded or broadly wedged-shaped at the base, acute or shortly acuminate, entire or repand, dark green or greyish, with thin woolly pubescence above, hoary-cottony beneath, with the veins slightly impressed above and prominent beneath; margins narrowly revolute. Stipules (rarely present) obliquely ovate, small. Catkins appearing before or with the young leaves, subsessile, generally with a few leaf-like bracts at the base; the male oblong; the female cylindrical and often very long. Catkin-scales oblong, subacute, densely pilose with very long straight white hairs. Stamens 2; filaments free, glabrous. Capsules ovate-conical, subsessile, cottony-woolly; style very long, exceeding the stigmas; stigmas filiform, cleft or bipartite. Young branches, buds, and leaves on both sides cottony-woolly.

Var. α , *arenaria*.

PLATE MCCCLXVIII.

S. arenaria, Linn. (ex parte). Sm. Engl. Bot. ed. i. No. 1809. Engl. Fl. Vol. IV. p. 204. Hook. Brit. Fl. ed. iv. p. 362.

Leaves oval-oblong or obovate-oblong, somewhat downy and at length subglabrous above, woolly beneath. Style as long as the capsule.

Var. β , *Stuartiana*.

PLATE MCCCLXIX.

S. Stuartiana, Sm. Engl. Bot. ed. i. No. 2586. Engl. Fl. Vol. IV. p. 203. Hook. Brit. Fl. ed. iv. p. 363.

Leaves oblong-elliptical or oblong-oblanccolate, woolly above, densely cottony silky beneath. Style as long as the capsule.

Var. γ , *pseudo-glauca*.

PLATE MCCCLXX.

S. glauca, Sm. (non Linn.), Engl. Bot. ed. i. No. 1810. Engl. Fl. Vol. IV. p. 201. Hook. Brit. Fl. ed. iv. p. 362.

Leaves oblong-elliptical or oblong-oblanccolate, woolly but soon subglabrous above, snow white and woolly beneath. Style shorter than the capsule, at first very short.

On wet rocks and by the sides of streams in the mountains of the Scotch Highlands. Not uncommon on the Clova and Breadalbane Mountains, Loch-na-gar and Braemar.

Scotland. Shrub. Early Summer.

A small shrub, rarely more than 2 or 3 feet high, with rather thick chestnut branches, divided into numerous straight twigs. Leaves 1 to 2 inches long, variable in shape and in the quantity of pubescence, on longer stalks than most of the species of the genus, and with these stalks much more dilated at the base. The male catkins I have not seen; they are said to be produced before the leaves. Female catkins 1 to 3 inches long, with or without leaves at the base, but never on distinct leafy stalks as in the true *S. glauca*. Catkin-scales brown, darker at the top. Germen usually white. The flower-buds are large, chestnut colour, and become glabrous long before the catkins expand.

The varieties are scarcely distinguishable to my eyes.

The only British species with which this can be confounded is *S. lanata*, but that has larger and broader leaves on much shorter petioles, which are less dilated at the base, and golden-haired catkins.

Downy Mountain Willow.

French, *Saule blanc de neige*. German, *Lappländische Weide*.

SECTION III.—CHAMELYX. *Fries*.

Catkins on rather long leafy persistent shoots, often from the terminal or subterminal buds, or on long or short leafless terminal

peduncles. "Nectary of 2 pieces" [one between the catkin-scale and the germen, the other opposite to it]. Stamens 2.

Small alpine shrubs, with glabrous or pubescent leaves, and the bark of the older stems commonly breaking off in flakes.

GROUP I.—FRIGIDÆ. *Fries.*

Small shrubs, with the main stems and branches exposed; main branches terminating in a barren shoot; flowering branches lateral. Catkin-scales coloured, subscarious.

SPECIES XXX.—**SALIX ARBUSCULA.** *Linn.*

PLATES MCCCCLXXI.—MCCCCLXXVI.

Rech. Ic. Fl. Germ. et Helv. Vol. XI. Tabs. DLXI. DLXII. Figs. 1196 to 2000, and DLXVI. Fig. 2006.

Billot, Fl. Gall. et Germ. Exsicc. No. 1962.

Wimmer, Sal. Europ. p. 102. Anders. Mon. Sal. p. 145. Hook. & Arn. Brit. Fl. ed. viii. p. 411. Bab. Man. Brit. Bot. ed. vi. p. 314.

Stems exposed, decumbent or erect; main branches terminating in a barren shoot. Leaves firm, flat or recurved, elliptical or oval and acute, or obovate and acuminate, serrulate, bright green, glabrous, shining, with slightly elevated veins above, more or less glaucous and very sparingly hairy with adpressed hairs beneath, at length usually glabrous. Stipules generally absent or very minute and ovate. Catkins opening at the same time as the leaf-buds, at the apex of numerous short leafless or leafy lateral shoots, not confined to the termination of the branches, but arranged along them, slender, cylindrical. Catkin-scales oblong-obovate, obtuse, embracing the base of the capsule, brown, very thickly and shortly pilose. Stamens 2; filaments free, glabrous. Capsule ovate-conical, tomentose, subsessile; style elongated, deeply cleft; stigmas thick, 2-cleft. Young branches downy, rarely subglabrous; young leaves silky pilose, at least on the underside.

Var. *α*, *carinata.*

PLATE MCCCCLXXI.

S. carinata, Sm. Engl. Bot. ed. i. No. 1363, and Engl. Fl. Vol. IV. p. 197. Hook. Brit. Fl. ed. iv. p. 372.

Suberect. Leaves broadly elliptical, folded into a keel and recurved, denticulate, underside slightly glaucous, veins slightly prominent.

Var. β , *prunifolia*.

PLATE MCCCCLXXII.

S. prunifolia, *Sm.* Engl. Bot. ed. i. No. 1361. Engl. Fl. Vol. IV. p. 193. *Hook.* Brit. Fl. ed. iv. p. 372.

Ascending. Leaves oval, nearly flat, serrate, glaucous beneath, the veins scarcely elevated on the upper side until the leaf is dry.

Var. γ , *venulosa*.

PLATE MCCCCLXXIII.

S. venulosa, *Sm.* Engl. Bot. ed. i. No. 1362. Engl. Fl. Vol. IV. p. 195. *Hook.* Brit. Fl. ed. iv. p. 371.

Decumbent. Leaves oval-elliptical, nearly flat, serrulate, glaucous beneath, with prominent veins on both surfaces.

Var. δ , *vaccinifolia*.

PLATE MCCCCLXXIV.

S. vaccinifolia, *Walker*; *Sm.* Engl. Bot. ed. i. No. 2341. *Hook.* Brit. Fl. ed. iv. p. 371.

S. vaccinifolia and *S. livida*, *Sm.* Engl. Fl. Vol. IV. pp. 195 and 199 (non *S. livida*, *Waldl.*).

Decumbent. Leaves elliptical, nearly flat, serrate, glaucous and more or less silky beneath, veins scarcely elevated on the upper side until the leaf is dry.

On rocky ledges of the Highland mountains, especially those of Breadalbane. Var. δ , *vaccinifolia*, also in the mountains in the south of Scotland.

Scotland. Shrub. Late Spring, Summer.

A small handsome shrub, intermediate between *S. phylicifolia* and *S. Myrsinites*, but certainly much nearer the latter, becoming more erect and sometimes 1 to 3 feet high under cultivation. When wild (at least in Scotland) the main stem is usually more or less decumbent and rooting, with the branches suberect or ascending or decumbent, dark chestnut, glossy, at first yellowish and with a few downy hairs. Leaves $\frac{3}{4}$ to $1\frac{1}{4}$ inch long, variable in breadth and in the degree of glaucescence of the underside as well as in the distinctness of the reticulation of the veins. Catkins $\frac{1}{2}$ to 1 inch long, very slender, the male catkins shorter than the female, and with very short stalks; the stalks of the female catkins often leafy, sometimes 1 inch long, but more usually about $\frac{1}{2}$ inch; rachis of the catkin downy. Catkin-scales darker coloured at the apex, half as long as the capsules,

clothed with rust-coloured hairs. Stamens at first reddish, afterwards yellow. Capsule very densely tomentose, with dirty white or rust-coloured hairs. Hairs of the coma of the seeds dull white or reddish white. Style much shorter than the capsule, but variable in length.

The var. β of the eighth edition of the "British Flora" I have not seen; it is described as having the leaves broadly or roundish-ovate, prominently veined above, green but scarcely shining on both sides. Dr. Walker-Arnott says it is precisely intermediate between some of the forms of *S. Arbuscula* and *S. Myrsinites*, and may be a hybrid. The ovaries are almost sessile, and the colour of the scales and the numerous lateral flower-shoots indicate its greater affinity to *S. arbuscula*.

Plum-leaved Willow.

French, *Saule glabre*.

SPECIES XXXI.—SALIX MYRSINITES. *Lin.*

PLATES MCCCLXXV. MCCCLXXVI.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLIX and DLX. figs. 1188—1194.

Wimm. Sal. Europ. p. 97.

Stems exposed, decumbent, main branches terminating in a barren shoot. Leaves firm, recurved, elliptical or oval or oblanceolate or obovate, obtuse or acute or acuminate, serrated or nearly entire, bright or dark green, glabrous, shining, with elevated veins above, green and glabrous or more or less hairy on the veins beneath; rarely pilose above or on both sides. Stipules rarely present, minute, lanceolate. Catkins opening at the same time as the leaf-buds or after them, at the apex of solitary or subsolitary rather long leafy lateral shoots, thick, oblong or oblong-cylindrical. Catkin-scales oval-oblanceolate, obtuse, dull purple, pilose. Stamens 2; filaments free, glabrous. Capsule lanceolate-conical or conical-subulate, pilose or pubescent, rarely glabrous at the base, on a stalk about as long as the nectary; style rather long, cleft at the apex; stigmas thick, generally notched or 2-cleft. Young branches thinly woolly or pilose; young leaves sparingly pilose on both sides; buds hairy, soon becoming glabrous.

Var. α , *serrata*.

PLATE MCCCLXXV.

S. Myrsinites, Sm. Engl. Bot. ed. i. No. 1360, and Engl. Fl. Vol. IV. p. 193. Hook.

Brit. Fl. ed. iv. p. 372. Hook. & Arn. Brit. Fl. ed. viii. p. 412. Bab. Man. Brit.

Bot. ed. vi. p. 315.

Leaves oval, acute, serrated, at length nearly glabrous. Catkins short or elongate, thick.

Var. β , *procumbens*.

PLATE MCCCLXXVI.

S. procumbens, *Forbes*. *Borrer* in *Engl. Bot. Suppl.* No. 2753. *Hook.* *Brit. Fl.* ed. iv. p. 473. *Hook. & Arn.* *Brit. Fl.* ed. viii. p. 412. *Bab. Man.* *Brit. Bot.* ed. vi. p. 315.

Leaves oval, subobtusely, very faintly serrated, at length nearly glabrous. Catkins elongate, thick.

Var. γ , *arbutifolia*.

Leaves elliptical or oblanceolate, acute or acuminate, very faintly serrated, at length nearly glabrous. Catkins rather elongate, thick.

In wet places, on the sides of mountains. Rare. It occurs on the Breadalbane, Clova, and Braemar mountains.

Scotland. Shrub. Summer.

A small shrub, rarely above a foot long, with shining chestnut bark; the stem contracted at the end of each year's growth, much branched, with the branches divaricate, some short and ascending, others longer and procumbent. Leaves very variable in shape and size, $\frac{3}{4}$ to $1\frac{1}{2}$ inch long, glossy, with conspicuously elevated veins on both surfaces. Catkins on stalks $\frac{1}{2}$ to 1 inch long, the catkins varying from $\frac{1}{2}$ to 2 inches in length, very thick for the size of the plant. Capsules olive or reddish-brown, rather thinly hairy, the hairs frequently deciduous. The length of the style and the depth to which it is cleft are very variable; the stigmas are very broad and spreading. Hairs of the coma of the seeds snow-white. The male catkins I have not seen, but the anthers are said to be blue or violet.

I am unable to see any grounds for supposing that *S. procumbens* is a species distinct from *S. Myrsinites*. The length of the catkin, given as one of its characters, is unsatisfactory; even on the same plant I have seen some catkins twice as long as others in the same stage of growth, and the length of the style is also inconstant.

Whortleberry-leaved Willow.

French, *Saule à feuilles D'Arbousier*.

SPECIES (?) XXXII.—**SALIX GRAHAMI**. "*Borrer MS.*" *Baker*.

PLATE MCCCLXXVII.

Baker in *Seemann's Journ. Bot.* 1867, p. 157, and Tab. 66.

Stem exposed, decumbent or ascending; main branches terminating in a barren shoot. Leaves numerous, firm, flat, oval or oval-obovate, obtuse, faintly crenate-serrate or nearly entire, green, glabrous,

shining, with elevated veins above, green beneath, where they are more or less hairy on the veins. Stipules absent (?). Catkins opening at the same time as the leaf-buds or after them, at the apex of numerous leafy lateral shoots arranged along the branches, rather slender, oblong-ovoid, short, few-flowered. Catkin-scales oblong-ob lanceolate, obtuse, olive, pilose. Stamens unknown. Capsule lanceolate-conical, glabrous, on a silky-hairy stalk, longer than the nectary; style long; stigmas rather slender, 2-cleft. Young branches thinly woolly; young leaves slightly pilose.

At Frouvyn, Sutherlandshire; found by the late Dr. Graham.

Scotland. Shrub. Early Summer. (?)

Of this plant I have seen only one wild specimen, in Mr. Borrer's herbarium, and a few from his garden. In Mr. Watson's herbarium there are specimens from the Edinburgh Botanic Garden. The growth of the plant is more like that of *S. phylicifolia* or *S. nigricans* than of any of the present group, but in the catkins and texture of the leaves it approaches nearly to *S. herbacea*, between which and *S. phylicifolia* or *S. nigricans* I suspect it to be a hybrid.

Stems (in the Edinburgh Botanic Garden plant) exposed, 1 to 3 feet long, ascending. Leaves, when full-grown, 1 to 1½ inch long, much less orbicular than in *S. herbacea*, and disposed all along the elongate barren, and short fertile branches. Catkins few-flowered, about ½ inch long, on a short glabrous peduncle, bare of flowers at its base. Catkin-scales similar to those of *S. Myrsinites*, not subpellucid as in *S. herbacea*. The stalk of the capsule is silky-hairy in *S. Grahami*: in *S. herbacea* it is glabrous; the style is also longer in the present plant.

It has been compared with *S. polaris* of Wahlenberg, which has a hairy capsule, but the mode of growth of that plant is precisely like that of *S. herbacea*, and quite different from that of *S. Grahami*.

Dr. Walker-Arnott, I suppose, speaks of *S. Grahami* as the willow which resembles *S. retusa*, but I can see no resemblance to that species.

Graham's Willow.

GROUP.—GLACIALIS. *Koch.*

Very small shrubs, with the main stems buried in the soil, the branches only exposed; main branches "terminating in a peduncle" (?), or in an undeveloped bud with a peduncle at its side. Catkin-scales scarious, coloured, and subpellucid.

SPECIES XXXIII.—**SALIX HERBACEA.** *Linn.*

PLATE MCCCLXXVIII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLVII. No. 1182.

Wimm. Sal. Europ. p. 125. *Sm.* Engl. Bot. ed. i. No. 1907, and Engl. Fl. Vol. IV. p. 199. *Hook.* Brit. Fl. ed. iv. p. 473. *Hook. & Arn.* Brit. Fl. ed. viii. p. 413.

Bab. Man. Brit. Bot. ed. vi. p. 316.

Stems buried, rooting; branches short, ascending or erect, some of the main ones (apparently) terminating in a peduncle. Leaves few, rather rigid, flat, suborbicular or broadly-oval, rounded or subcordate at the base, obtuse or retuse at the apex, crenate-serrate or serrate, green, glabrous, shining, and with strongly elevated reticulated veins on both surfaces. Stipules absent or minute, ovate. Bud-scales sometimes persistent. Catkins opening after the leaf-buds, on very short leafless peduncles apparently terminating some of the main branches, rather slender, oblong-ovoid, short, few-flowered; catkin-scales oblong-obovate or oblanceolate, obtuse, yellowish-olive, or purplish, subglabrous, ciliated and sometimes pilose within on the inside. Stamens 2; filaments free, glabrous. Capsule lanceolate-conical, on a glabrous (rarely slightly silky-hairy) stalk shorter than the nectary; style short; stigmas rather slender, 2-cleft. Young branches pubescent; under side of the midrib of the leaves sparingly pilose, soon glabrous; buds glabrous.

On the tops of high mountains; on the Beacon of Breckon, Snowdon, the mountains of the north of England and south of Scotland. Very plentiful on most of the Highland mountains, from 2,500 to 3,000 feet. The lowest elevation at which it is known to occur in Scotland is on Hoy Hill, Orkney, the height of which is, I believe, under 1,600 feet. Local, but widely distributed in Ireland, and descending as low as 1,200 feet.

England, Scotland, Ireland. Shrub. Summer.

A very small plant, the greater part of it buried in the barren rocky débris in which it grows, and in which the stems often ramify for some distance; the exposed part of the branches from 1 to 3 inches long, each with 2 to 6 leaves on each twig. Leaves on very short petioles, $\frac{1}{4}$ to 1 inch long, deep green, beautifully marked with a network of veins, and generally marked with minute white points. The branches which terminate in peduncles are similar to the others, but the peduncle is not truly terminal, as there is a bud in the axil of the uppermost leaf, which represents the real direct prolongation of the branch, but this bud is not developed till the year succeeding that in

which the catkin is produced; stalk of the catkin pilose, $\frac{1}{8}$ to $\frac{1}{4}$ inch long. Flowers 3 to 12 in the female catkins. The capsule is very shortly stalked, often tinged with purple; style shorter than the stigmas, which are recurved. The male catkins I have not seen in a recent state; the anthers are described by Dr. Arnott as yellow or brown when empty, by Wimmer as sometimes violet, sometimes golden.

Least Willow.

French, *Saule herbacé*. German, *Krautartige Weide*.

SPECIES XXXIV.—**SALIX RETICULATA.** *Linn.*

PLATE MCCCLXXIX.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DLVII. Fig. 1184.

Wimm. Sal. Europ. p. 129. *Sm.* Engl. Bot. ed. i. No. 1908. Engl. Fl. Vol. IV. p.

200. *Hook.* in Brit. Fl. ed. iv. p. 361. *Hook. & Arn.* Brit. Fl. ed. viii. p. 405.

Bab. Man. Brit. Bot. ed. vi. p. 316.

"*Chamititia reticulata*, *Kerner*," test. *Wimm.* l.c.

Stems mostly buried, rooting; branches short, ascending, some of the main ones (apparently) terminating in a peduncle. Leaves few, subcoriaceous, oval or suborbicular or obovate, rounded at the base (rarely wedgeshaped or subcordate), rounded or retuse at the apex, entire or repand, dark dull green, glabrous or subglabrous rugose above, from the veins being impressed, glabrous and hoary and with elevated reticulated yellowish veins beneath. Stipules absent or rudimentary. Bud-scales often persistent. Catkins opening after the leaf-buds, on rather long leafless peduncles apparently terminating some of the main branches, slender, oblong-cylindrical, short, many-flowered; catkin-scales oblong-oblongate or oblong-obovate, rounded or truncate, often purplish, at length brown. Stamens 2; filaments free, glabrous. Capsule ovate-conical, acuminate, hoary, tomentose, subsessile; style very short; stigmas oblong, notched, or 2-cleft. Young branches glabrous; young leaves pilose with very deciduous hairs; buds pubescent, very soon glabrous.

On dry rocky ledges and mountains, especially those composed of mica-slate. Local. Abundant in the Breadalbane and Clova Mountains; in Aberdeenshire it is known to grow only in Glen Callater; reported to have been found by Dr. Graham on Ben Hope, Sutherland; stated to occur in the counties of Carnarvon, York, Westmoreland, and Cumberland, but erroneously, as *S. herbacea* was the plant meant by the older botanists.

Scotland. Shrub. Summer, Autumn.

A handsome shrub, very similar in its mode of growth to *S.*

herbacea, but much stouter, with the stems less *deeply buried*, and much more of the branches exposed, forming large flakes often 1 or 2 feet across; branches chestnut, shining, tortuous, with numerous short ascending twigs, with 3 to 5 leaves on each subdivision. Leaves $\frac{3}{4}$ to 2 inches long, exclusive of the petiole, which is usually half the length of the lamina. The persistent bud-scales might readily be mistaken for stipules. The catkins are produced in precisely the same manner as in *S. herbacea*, i.e. apparently terminal, from the bud at the base of the uppermost leaf remaining undeveloped until the succeeding season. In both *S. reticulata* and *S. herbacea* I have seen abnormal specimens in which this terminal bud had grown out into a barren shoot during the same season, and in which consequently the peduncle was lateral and leafless. Peduncles $\frac{3}{4}$ to 2 inches long, generally curved, glabrous or finely downy. Catkins $\frac{1}{2}$ to 1 inch long, the scales much shorter than the stamens and germen. Anthers reddish purple. Capsule obtuse; style scarcely any. Coma of the seeds dirty white. Leaves very unlike those of any other of the British willows, somewhat resembling those of *Cotoniaster*, which (Mr. H. C. Watson suggests) may have been mistaken for *S. reticulata* in the county of Carnarvon.

Reticulate-leaved Willow.

French, *Saule réticulé*.

EXCLUDED SPECIES.

JUGLANS REGIA. *Lin.*

The walnut cannot be considered as naturalised in this country, although it is often planted in situations where it might be mistaken for a native tree.

QUERCUS CERRIS. *Lin.*

I have had this sent me from various places, but it has no more claim to be admitted to the British Flora than the laburnum or horse-chestnut.

BETULA INTERMEDIA. *Thomas.*

It is reported that *B. intermedia* has been found in Forfarshire.—*Wats. Cyb. Brit.* p. 382.

POPULUS DILITATA. *Ait.*

The Lombardy poplar, a subspecies of *P. nigra*, is often planted. I have seen only the male plant.

POPULUS MONILIFERA. *Ait.*

Frequently planted. I have had it sent me in mistake for *P. nigra*. This and the two next are natives of North America.

POPULUS BALSAMIFERA. *Linn.*

Often planted, and sometimes in stations where it might be supposed to be wild.

POPULUS CANDICANS. *Ait.*

This subspecies of *P. balsamifera* I have had sent from Thirsk, Yorkshire, and various other places.

SALIX PETIOLARIS. *Smith.*

Engl. Bot. ed. i. No. 1147.

Sent by Dickson to Crowe without an exact locality being stated; said to have been found at Possil Marsh, near Glasgow, by G. Don. It is a native of North America.

SALIX PONTEDERANA. *Willd.*

No. 36 of Leefe's *Sal. Brit.*, which is from Shrewsbury, collected by the Rev. W. A. Leighton, is said by Andersson to have much in common with *S. Pontederana*.—*Bot. Gaz.* vol. iii. p. 59. The specimen in my set is rightly named *S. ferruginea*.

SALIX DASYCLADOS. *Wimm.*

No. 37 of Leefe's *Sal. Brit.*, which is from Audley End, Essex, is named by Andersson, "certainly *S. dasyclados*."—*Bot. Gaz.* p. 59. The specimen in my set is rightly named *S. acuminata*, *Sm.*, a plant which Dr. Andersson at that time evidently misunderstood.

SALIX GRANDIFOLIA. *Ser.*

A plant gathered near North Queensferry by Mr. H. C. Watson was said by Dr. Andersson to have the leaves very similar to those of *S. grandifolia*.

SALIX HASTATA. *Linn.*

S. malifolia, *Sm.* Engl. Bot. ed. i. No. 1617.

This was sent by Mr. Crowe, under the belief that he had found it somewhere in Norfolk; said to have been found at Barrie, near Dundee; and reported from Middlesex, by Mr. Joseph Woods. This

is an alpine species, which cannot have been native, if indeed it were ever found in any of the localities mentioned.

SALIX RETUSA. *Linn.*

Of the variety *serpyllifolia* of this plant, Fries states, that "beautiful specimens of the var. *serpyllifolia* are in Hornimann's herbarium." Mant. i. 76. *S. retusa* is also said to have been found on Ben Lawers, but on the utterly unreliable authority of Dickson: Dickson, in his "Fasciculus," published garden specimens of *Trichonema Bulbocodium* to represent the Jersey T. Columnæ, also cultivated specimens of *Echium Italicum* to represent the Jersey *E. plantagineum*.

SUB-CLASS VI.—GYMNOSPERMÆ.

Perianth none. Ovules naked, at least at the time of flowering, fertilised by the pollen falling directly on the ovule; ovules containing secondary embryo sacs (*corpuscula*), enclosed in the primary one, and with numerous embryos, only one of which, however, becomes fully developed.

ORDER LXXIII.—CONIFERÆ.

Trees or shrubs, with the stem increasing by regular annual layers, destitute of ducts, and composed of woody cells marked on the sides with circular disks which have a central dot. Leaves scattered or opposite or in fascicles, generally acicular, rarely expanded and flat, in the latter case with the veins parallel. Flowers in catkins, monœcious or diœcious, destitute of perianth; the female catkins in fruit forming a strobile or cone, with woody scales, or a pulpy berrylike galbulus, with the scales coherent and fleshy, more rarely with the seed naked, surrounded at the base by a fleshy cupshaped arillus. Seed albuminous.

SUB-ORDER I.—ABIETINÆ.

Male flowers in catkins. Female flowers in a catkin, usually numerous, placed upon scales in the axils of bracts. Apex or opening of the ovules turned downwards. Fruit consisting of a cone, with woody or somewhat leathery scales.

GENUS I.—PINUS. Tournef.

Flowers monœcious. Male flowers in rather small ovoid catkins arranged in spikes, reduced to naked stamens: anther-cells 2, placed upon a scalelike shortly-stalked connective. Female flowers in ovoid catkins consisting of numerous imbricated scales, each scale in the axil of a deciduous bract, and bearing 2 inverted ovules, which are produced into a tube at the apex, i.e. towards the axis of the catkin. Fruit a cone, formed of imbricated persistent woody scales, often thickened at the exposed part (*escutcheon*) of the apex. Seeds 2 on each scale, with a bony testa, and a very thin membranous wing; albumen fleshy; cotyledons 3 to 12; radicle inferior.

Resinous trees, rarely shrubs, with scaly buds, the primary leaves scarious, the secondary leaves filiform-acicular, in fascicles of 2 to 5 in the axils of the deciduous chafflike primary leaves. Wood marked with disks in single rows, or if in double rows with the disks of the same height, in either case without spiral markings.

The name of this genus of plants is derived from the Greek word *πινος*, a pine tree, as used by Theophrastus. Some authors derive the word *Pinus* from *pin* or *pyn*, a mountain or rock in Celtic, in allusion to the habitat of the tree: the British towns Penryn, Penrith, and Penmaen, and others, are so called from being built on or near rocks.

SPECIES I.—PINUS SYLVESTRIS. Linn.**PLATE MCCCLXXX.**

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXXI. Fig. 1127.

Billot. Fl. Gall. et Germ. Exsicc. No. 3212.

Leaves 2 in a fascicle, distributed all round the stem, rather long, rigid, channeled above, convex beneath, acute and pungent, finely cartilaginous-serrulate, glaucescent. Anther-scale very slightly prolonged beyond the anther-cells. Cones shortly stalked, solitary or in pairs, rarely in whorls of 3, reflexed from the first, when mature short, lanceolate-conical, acute, of rather few scales; escutcheon of the scales much thickened, rhombic, with the diagonals nearly equal, convex, with a blunt transverse keel and a small reflexed central deciduous tubercle. Solid part of the seed one-fourth of the length from the base of the seed to the apex of the wing; wing pale brown, concolorous.

On heathy mountains, formerly widely distributed, but now native only in the Highlands of Scotland, especially in Braemar, and at Rothiemurchus. Possibly in co. Mayo, a single tree, at the head of Lough Conn, may be the last relic of an ancient Irish forest. It is

naturalised in sandy and gravelly districts in England; in Surrey, and more especially in the Poole basin.

[England,] Scotland, Ireland (?). Tree. Early Summer.

A tall tree, pyramidal when young, when old with a flat-topped spreading head. Bark greyish-red, at length fissured, and finally easily breaking off in flakes. Ultimate branches rather slender, reddish ash-coloured, tortuous. Leaves very numerous, persistent, 1 to 3 inches long, very slightly glaucous, the pair in each fascicle enveloped at the base in numerous scarious scales with filamentous-lacinate margins. Male catkins about $\frac{1}{4}$ inch long, aggregated in a spike, terminated by a bud, which grows out into a barren shoot. Mature cones 1 to $1\frac{1}{2}$ inch long in the wild specimens of the Mar Forest, greenish ash-colour, at length ash-colour, with rather few scales, which increase in length towards the apex; escutcheon of the largest scales little more than $\frac{1}{4}$ inch across each diagonal. Seeds, including the wing, about $\frac{1}{2}$ inch long.

Scotch Fir.

French, *Pin sauvage*. German, *Kiefer*, *Föhre*.

This fine tree is the British representative of a large group of plants, and is second in utility only to the oak. It grows, under favourable circumstances, to a great size, attaining a height of from seventy to a hundred feet, the trunk having a diameter of four or five feet. There are but few of these gigantic pines now left standing in the Highland forests in which they grew; most of them have been felled of late years for their valuable timber. One of the most extensive woods in the island, called the Forest of Glenmore, belonging to the Duke of Richmond, was cut down in the early part of the present century, and sold for 10,000*l*. Of this timber forty-one ships were built at the mouth of the Spey, of an aggregate burden of nineteen thousand tons. A plank cut from one of the finest trees in this noble forest, measured five feet five inches in diameter. The soil in the Highland forests is found to be of very different qualities, which regulates the quality of the timber. The richest ground produces the largest trees, consequently not such fine-grained wood as in those trees grown on sandy and poorer soil. The Scotch pine or fir generally reaches its full growth in from 150 to 250 years: after that period it becomes decayed; and in soils unsuited to its growth ceases to increase at a much earlier period. The most extensive forest in Scotland was the Rothiemurchus Forest, containing above sixteen square miles. It was united with the Forest of Glenmore, so as to form one continuous forest; but the high price of timber hastened its destruction, and after yielding a handsome revenue to its owner, there are now but few trees left where once some of the most magnificent specimens of the pine grew. The Braemar and Invercauld Forests still stand almost entire, and some splendid trees are to be found in them. Sir. T. D. Lauder says, "It is curious to observe in the Rothiemurchus Forest, and in all others, how the work or renovation goes on. The young seedlings come up as thick as they do in the nurseryman's seed-beds, and in the same relative degree of thickness do they continue to grow, till they are old enough to be cut down. The competition which takes place between the adjacent plants creates a rivalry that increases their upward growth; whilst the exclusion of the air prevents the formation of lateral branches, or destroys them soon after they are formed. Thus nature produces by far the most

valuable timber; for it is tall, straight, of uniform diameter throughout its length, and free from knots; all which qualities combine to render it fit for spars, which fetch double or treble the sum per foot that the other trees do. The large and spreading trees are on the outskirts of the masses, and straggle here and there in groups or single trees." These last are the trees which are described by tourists, and drawn by artists as the Highland pine.

The pine forests of the Continent have suffered like those of the Highlands of Scotland, but in Germany and France the work of reproduction goes on with a rapidity which is interrupted in Scotland by the pasturing of cattle and sheep, which, as well as the deer, browse on the young seedling trees, and prevent their growth.

The wood of the pine is light, but strong, and nearly as durable as oak when kept dry, and answers well for house-building, and is only inferior to oak for ships, the best masts and spars being made of it. A great deal of the pine wood that is used in ship-yards is imported from the Baltic and from Norway, and the most celebrated masts in Europe are those of Riga. The value of the wood consists in its freedom from knots, and it is found that the knots of this species are more easily worked and less liable to drop out of the flooring boards than is the case with knotty boards of the spruce or silver fir. The facility with which the wood of the Scotch pine is worked occasions its employment in almost all kinds of joinery and house-carpentry, to the exclusion of every other kind of timber wherever it can be procured. It is at once straight, light, stiff, and consequently best fitted for rafters, girders, joists, &c., which may be made of smaller dimensions of this timber than any other. Complaint has been made of the want of durability in the timber of the Scotch pine, and a Mr. Menteath of Closeburn has for upwards of fifty years caused all his Scotch pine timber to be steeped in lime water, after it has been cut and fitted for the different purposes required. It appears that the alkali of the lime neutralises, in some degree, the albuminous nature of the soft wood, or that the water acts as a solvent, and extracts a part of it; for while Scotch pine of twenty or thirty years' growth seldom lasts thirty years before it is destroyed by worms, Mr. Loudon tells us that timber prepared by Mr. Menteath's process has lasted much longer, and is still as sound as ever. Mr. Loudon suggests that alum dissolved in water might be even more effective than the lime. As fuel, the wood of the Scotch pine lights easily, and burns with great rapidity; but it produces a black and very disagreeable smoke. The faggot wood of the Scotch pine is valued by the chalk and lime-burners of England more than any other, on account of its rapid burning and intense heat, and consequent saving of time in attending on the kilns. The roots, which are extremely resinous, were formerly used in Scotland as a substitute for candles. The resinous juice, whether exuding naturally, or procured by incision and distillation, produces tar, pitch, rosin, turpentine, and the essential oil of turpentine employed in house-painting. The turpentine of the Scotch pine is, however, inferior to that of the silver fir, and is only used for the coarsest kind of work. To produce it, a narrow piece of bark is stripped off the trunk of the tree in spring, when the sap is in motion, and a notch is cut in the tree at the bottom of the channel formed by removing the bark, to receive the resinous juice, which will run freely down to it. As it runs down it leaves a white matter like cream, but a little thicker, which is very different from all the kinds of resin or turpentine in use, and which is generally sold to be used in the making of flambeaux instead of white beeswax. The matter that is received in the hole at the bottom is taken up with ladles, and put into a large basket. A great part of this immediately runs through, and this is common turpentine. It is received into stone or earthen pots, and is then ready for sale. The thicker matter which remains

in the basket is put into a common alembic, and a large quantity of water being added, the liquor is distilled as long as any oil floats on the top. This oil is the common spirit or oil of turpentine, and the remaining matter at the bottom of the still is the common yellow rosin. Another important product of the pine is tar. The process by which it is obtained is very simple. The situation most favourable to the process is in a forest near to a marsh or bog; because the roots of the Scotch pine from which tar is principally extracted are always most productive in such places. A conical cavity is made in the ground (generally in the side of a bank or sloping hill), and the roots, together with logs and billets of the wood, being neatly trussed in a stack of the same conical shape, are let into the cavity. The whole is then covered with turf to prevent the volatile parts from being dissipated, which, by means of a heavy wooden mallet and a stamper, is beaten down, and rendered as firm as possible above the wood. The stack of billets is then kindled, and a slow combustion of the pine takes place, as in making charcoal. During this combustion the tar exudes, and a cast-iron pan being fixed at the bottom of the funnel, with a spout which projects through the side of the bank, barrels are placed beneath this spout to collect the fluid as it comes away. As fast as these barrels are filled, they are bunged, and are ready for immediate exportation. During this process, the wood itself being drained, is converted into charcoal. When pitch is to be made, the tar, without anything being added to it, is put into large copper vessels (fixed in masonry to prevent any danger of the tar taking fire), and is then suffered to boil for some time, after which it is let out, and, when cold, hardens, and becomes pitch.

Tar and charcoal are obtained in Russia much in the same manner as in Sweden, from the bottoms of the trunks and roots of trees. In Germany the process is conducted with great accuracy. The process in Scotland is very simple, and the tar which is extracted is very coarse, and used only for local purposes. Flambeaux of the roots and trunks of the pine are used both in Britain and in the North of Europe. Hall, in his "Travels in Scotland," relates a story of a bet made in London by a Highland chief that some massive silver candlesticks on the table at a gentleman's house where he was dining were not better or more valuable than those commonly in use in the Highlands. The chieftain won his bet by sending to his estate for four Highlanders of his clan, and producing them with torches of blazing fir in their hands, declaring that they were the candlesticks to which he alluded. Dr. Howison observes that "the little tallow or oil which the peasantry in Russia can procure is entirely consumed at the shrines in the churches, and before the images in their isbas or huts." To supply the place of candles, "they take long billets of red Scotch pine, which they dry carefully near their stoves during the tedious winter, and split, as occasion requires, into two long laths. When a traveller arrives, or a light is required for any purpose, one of these laths is lighted and fixed in a wooden frame, which holds it in a horizontal position. It gives a bright flame, but only burns for a short time."

As an ornamental tree various opinions are entertained of the Scotch fir. Mason says:—

‘The Scottish fir, in murky file,
Rears his inglorious head, and blots the fair horizon.’

Gilpin accounts for the disfavour in which the Scotch fir is commonly held in a landscape on two grounds. He says: "People object first to its colour; its murky hue is displeasing. A second source of contempt in which the Scotch fir is generally held is our rarely seeing it in a picturesque state. Scotch firs are seldom planted as

single trees, or in a judicious group, but generally in close compact bodies, in thick array, which suffocates or cramps them, and, if ever they get loose from this bondage, they are already ruined. Their lateral branches are gone, and their stems are drawn into poles, on which their heads appear stuck as on a centre; whereas, if the tree had been grown in its natural state, all mischief had been prevented; its stem would have taken an easy sweep, and its lateral branches, which naturally grow with almost as much beautiful irregularity as those of deciduous trees, would have hung loosely and negligently, and the more so, as there is something peculiarly light and feathery in its foliage." He adds, "The Scotch fir in perfection I think a very fine tree, though we have little idea of its beauty, and it is generally treated with contempt. It is a hardy plant, and is therefore put to every servile office. If you wish to screen your house from the south-west wind, plant Scotch firs, and plant them close and thick. If you want to shelter a nursery of young trees, plant Scotch firs, and the phrase is, you may afterwards weed them out as you please. This is ignominious. I wish not to rob society of these hardy services from the Scotch fir, nor do I mean to set it in competition with many trees of the forest which, in their infant state, it is accustomed to shelter. All I mean is, to rescue it from the disgrace of being thought fit for nothing else, and to establish its character as a picturesque tree." Sir T. D. Lauder agrees with Mr. Gilpin in his approbation of the Scotch fir, and Mr. Loudon says that he has seen it towering in full majesty in the midst of some appropriate Highland scene, and sending its limbs abroad with all the unconstrained freedom of a hardy mountaineer, as if it claimed dominion over the savage regions around it, and he has looked upon it as a very sublime object. People who have not seen it in its native climate and soil, and who judge of it from the wretched abortions which are swaddled and suffocated in English plantations, in deep, heavy, and eternally wet clays, may well call it a wretched tree; but when its foot is among its own Highland heather, and when it stands freely on its native knoll of dry gravel or thinly-covered rock, over which its roots wander far in the wildest reticulation, whilst its tall, furrowed, and often gracefully sweeping red and grey trunk of enormous circumference rears aloft its high umbrageous canopy, then would the greatest sceptic on this point be compelled to prostrate his mind before it with a veneration which perhaps was never before excited in him by any other tree. Milton writes of the pine-tree. Speaking of the fallen angels, he says:—

"Faithful, now they stood,
Their glory withered; as when heaven's fire
Hath scathed the forest oaks or mountain pines,
With singed top their stately growth, though bare,
Stands on the blasted heath."

The pine is the badge of the clan Mac Gregor, and, according to "The Lady of the Lake," of the Mac Alpines also:—

"Hail to the chief who in triumph advances!
Honoured and blest be the evergreen pine!
Long may the tree in his banner that glances
Flourish, the shelter and grace of our line."

And again Sir Walter Scott writes:—

"And higher yet the pine-tree hung
His shatter'd trunk, and frequent flung,
Where seem'd the cliffs to meet on high,
His boughs athwart the narrow'd sky"

Churchill advocates the growth of the Scotch fir in various soils and situations, and says :—

“ That pine of mountain race,
The fir, the Scotch fir, never out of place.”

In Wordsworth's poems we often read of the fir :—

“ Unheeded night has overcome the vales ;
On the dark earth the baffled vision fails ;
The latest lingerer of the forest train,
The lone black fir, forsakes the faded plain ”

And again :—

“ And there I sit at evening, where the steep
Of Silver-how and Grasmere's placid lake
And one green island gleam between the stems
Of the dark firs—a visionary scene.
While o'er my head,
At every impulse of the moving breeze,
The fir-grove murmurs with a sea-like sound,
Alone I tread this path.”

It is very probable that in ancient times the northern part of our island was nearly covered with pine forests, many of which have become submerged, and only exist in bogs and morasses, whence their remains are frequently dug up. The most curious of these subterraneous forests is that at Hatfield Chase, in Yorkshire, which is supposed to comprise 180,000 acres. It is supposed that the Romans, during the very early times of their habitation of this island, destroyed this forest, partly by cutting down the trees, and partly by burning them, and that these fallen trees dammed up the rivers, which, forming a lake, gave origin to the large turf moors of that part of the country. Mr. Whittaker, in his “History of Manchester,” tells us that the fir is perpetually found in the moss bogs in the neighbourhood of that city. In the Irish morasses bog pine is very plentiful, and the wood is much valued.

The young shoots of the Scotch fir, stripped of the leaves when they are just beginning to appear, are said to make an agreeable salad, and they afford a fragrant essential oil when distilled. An infusion of the buds has been recommended as an antiscorbutic, as are the fresh cones boiled, which are a principal ingredient in spruce beer. The air impregnated with the balmy exhalation of fir trees has been supposed wholesome for delicate lungs. The fresh inner bark is much liked by children, on account of a sweet milky juice, which is, in fact, a new layer of wood in an incipient state. In some parts of the north of Europe this inner bark is made into a harsh, disagreeable kind of bread, which is eaten in times of scarcity. The floor of the Temple at Jerusalem and the musical instruments of King David were made of fir, though it was not so highly prized as its allies, the cypress and poplar wood. The Talmudists relate that it was customary in Judea for each family to plant a cedar before the house at the birth of a son, and a fir at the birth of a daughter. These trees were deemed sacred, and were not cut down till the children were grown up, and needed the timber for their household furniture. At the time when Judea was subject to the Romans, after the destruction of Jerusalem by Titus, the daughter of the Emperor Adrian happened to be travelling through that country, when her chariot was injured, and her attendants proceeded in an overbearing manner to cut down one of the sacred trees to be used in repairing it. The inhabitants of the place rose and massacred the train of the prin-

cess, who was so enraged that she forced her father to make war against the Jews, to humble their pride.

The victors at the Isthmian games held at Corinth were crowned with garlands of pine branches. The cones were used by the Romans to flavour their wines, being thrown into the vats and suffered to float—a custom which is still in existence in Italy. Hence the thyrsus or wand of Bacchus terminates in a fir cone. The pine appears to have been held sacred by the Assyrians. Mr. Layard tells us that on the sculptures discovered by him during his excavations at Nimroud, the ancient Nineveh, there are many representations of figures bearing fir cones. Tennyson's lines in "The Complaint of CEnone" are familiar to many readers:—

"O mother! hear me yet before I die:
 They came, they cut away my tallest pines,
 My dark tall pines, that plumed the craggy ledge.
 High over the blue gorge, and all between
 The snowy peak and snow-white cataract,
 Foster'd the callow eaglet, from beneath
 Whose thick mysterious boughs in the dark morn
 The panther's roar came muffled while I sat
 Low in the valley. Never, never more
 Shall lone CEnone see the morning mist
 Sweep through them—never see them overlaid
 With narrow moonlit slips of silver cloud
 Between the loud stream and the trembling stars."

Gerarde states that these trees are "so full of a resinous substance that they burn like a torch or linke," and that they were therefore called "firre wood" and "*fire wood*."

SPECIES II.—**PINUS PINASTER.** *Ait.*

PLATE MCCCLXXXI.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXXV. Fig. 1132.

P. maritima, Lam. Fl. Fr. Vol. II. p. 201 (non Ait.)

Leaves 2 in a fascicle, distributed all round the stem, long, rigid, channeled above, convex beneath, acute, pungent, cartilaginous-serrulate, scarcely glaucous. Anther-scale conspicuously prolonged beyond the anther-cells, and forming a denticulated crest. Cones in pairs or whorls of 3 to 7, rarely solitary, those of the year spreading, shortly stalked; mature cones elliptical-lanceolate-conical, recurved (or spreading-recurved when they are numerous in a whorl), acute, of very numerous scales; escutcheon of the scales much thickened, transversely rhombic, subpyramidal, with a transverse keel with a prominent centre and an erect point. Solid part of the seed one-fifth of the length from the base of the seed to the apex of the wing; wing pale along the outer curved margin, but with fuscous longitudinal stripes from the straight inner margin to beyond the middle.

Naturalised in the Poole basin. Formerly a native of Ireland, and possibly a few plants still exist in the neighbourhood of Tarbert, Kerry.

[England,] Ireland (?). Tree. Early Summer.

A sturdy tree, with reddish-piceous rather even bark in layerlike flakes. Branches very stout, much more so than in the Scotch fir, and with larger scars, with the reflexed points (as long as they remain) much more prominent. Leaves 3 to 8 inches long, thicker and more deeply channeled than in *P. sylvestris*, surrounded by reddish ash-coloured scales, the margins bound together by numerous slender filaments. Cones 4 to 6 inches long, liver-colour; escutcheon of the largest scales about an inch across the transverse diameter by $\frac{5}{8}$ across that in a line with the longitudinal axis of the cone. Seeds, including the wing, about $1\frac{1}{2}$ inch long; the solid part fuscous, and nearly $\frac{1}{4}$ inch long.

I am indebted to Dr. Falls, of Bournemouth, for fresh specimens of the plant, which is completely naturalised in that neighbourhood.

Cluster Pine.

French, *Pin maritime*.

This is a beautiful tree, with much longer and brighter coloured leaves than the Scotch pine, and with larger cones arranged in clusters around the branches, and the scales ending in a rigid point. It grows best in deep loose soils, throwing down long tap roots that take hold even in the lightest soils, so that it can flourish even in the drifting sands of the sea-shore. Great use has been made of it in France in covering immense districts of barren sands. Around the Bay of Biscay large plantations of this pine have been formed to protect the land from the drifting sand which threatened to convert it into a desert. The downs around the Gulf of Gascony were at one time mere sandy wastes covering 300 square miles. Bremondier compared this immense surface to a sea which, when agitated to fury by a tempest of wind, overwhelmed everything in its neighbourhood. By sowing this tract of sand with the seeds of the pinaster mixed with those of the common broom, its whole nature has been changed. The seeds were sown behind rows of hurdles, and the broom, growing up quickly, protects the young pines from being rooted up or smothered by the sand. In 1811 a Commission appointed by the French Government made a report on the downs, and announced that about 12,500 acres of downs had been covered with thriving plantations, constituting the principal riches of the inhabitants, who are almost entirely supported by the preparation of resin and tar from the pinaster forests. Though the wood of the pinaster is soft and not of long duration, it is employed in the marine arsenal at Toulon for the outer cases of all the packages which are put on board vessels, and principally for the piles and props which are used for sustaining the frames of vessels while they are being constructed. In Bordeaux and in Provence it is employed for the common kinds of carpentry, for packing-boxes, and for fuel, but the most valuable purposes to which the tree is applied is the production of tar, resin, and lampblack. The manufacture and collecting of these substances forms a very active business in climates where the trees attain perfection. In Britain it would not be profitable to attempt it, as our summers are not sufficiently hot to produce the

secretion in any quantity. The way in which resin is obtained from the pinaster in France is described at length in Mr. Loudon's arboretum. When the trees have attained the age of from twenty-five to thirty years, with trunks about four feet in circumference, they are thought to have acquired sufficient strength to bear the extraction of their sap. The *résimier* (which is the name given to the person who collects the resin) usually tests the tree by putting his arm round it, and if the trunk is so thick that he cannot see his fingers on the other side, he considers the tree of sufficient size for him to commence his operations. A wound is made in the lower part of the trunk, and a small trough attached to it, through which the fluid resin flows into a reservoir. Every week the wound requires reopening and slightly increasing, and one man is expected to manage from 1,500 to 2,000 trees. The operation is continued annually on the same tree by removing a portion of the bark till the part laid bare is from twelve to fifteen feet in height, which takes place in seven or eight years. To procure tar, the wood of the tree is burned, and during this process lampblack is formed on the cover of the furnace; but a superior kind is made from the straw, &c., used in straining the resin, which is burned for the sole purpose of obtaining this pigment. Turpentine is rarely made from the pinaster, as it is very inferior to that produced from the silver fir, though recently, when the ports of the Southern States of America were blockaded, the bulk of the turpentine used in this country was from the pinaster. There are many other species of pine not naturalised in this country, though extensively cultivated. The Stone Pine, *P. pinca*, a native of Southern Europe and the Levant, is one of the species of which the seeds are eaten. They are called Pignons by the French, *Pinocchi* by the Italians, and are commonly eaten for dessert, and made into sweetmeats. Several other species also yield eatable seeds, such as *P. Sabiniana*, the seeds of which are collected in immense quantities by the Californian and Oregon Indians as an article of winter food. The *Firs*, distinguished generally from the Pines as belonging to the genus *Abies*, but greatly resembling them, yield the same products, but are none of them British natives. The common Norway spruce fir, *A. excelsa*, yields a resin known as frankincense, which, when melted in water and strained, becomes Burgundy pitch. The young leaf-buds or shoots are boiled down in water to form essence of spruce, from which spruce beer is made; and its timber is much used under the name of *white deal*. *A. picea*, the silver fir, yields the finest turpentine; and *A. larix* is the common Larch Fir, the wood of which is much prized, and is very durable.

SUB-ORDER II.—CUPRESSINEÆ.

Male flowers in catkins. Female flowers few, in a small catkin, consisting of scales on which the ovules are borne, the apex or opening of the ovule superior, the scales not in the axil of bracts. Fruit a small cone, with woody or leathery scales, or of 3 to 6 fleshy scales, cohering and forming a false drupe or berry.

GENUS II.—JUNIPERUS. *Linn.*

Flowers diœcious, or rarely monœcious on different branches of the same plant. Male flowers in minute globular solitary axillary

or subterminal catkins, reduced to naked stamens: anther-cells 3 to 6, attached to the lower edge of a subsessile scale (connective?). Female flowers in ovoid catkins, consisting of 3 to 6 scales, each scale bearing 1 to 3 erect ovules, which are produced into a tube at the apex. Fruit a false berry (*galbule*), formed by the 3 or 6 uppermost scales becoming enlarged, fleshy, and completely coherent at maturity, and enclosing the seeds. Seeds 1 to 3, angular, not winged, with a bony testa; albumen fleshy; cotyledons 2; radicle superior.

Resinous evergreen shrubs or trees, with naked buds and verticillate linear-strapshaped often pungent leaves, or with imbricated minute scalelike leaves. Wood cells with disks, but without spiral markings.

Dr. Mayne gives us the derivation of the name of this genus thus: "as if *Jūve'-nipērus*, from *jūvēnis*, young; *pārio*, to bring forth, because it brings forth new or young berries while the old are in a matured state."

SPECIES I.—**JUNIPERUS COMMUNIS.** *Linn.*

PLATES MCCCLXXXII. MCCCLXXXIII.

Young branches angulated. Buds scaly. Leaves channeled above, 3 in a whorl, articulated at the base, bluntly keeled beneath, rigid, strapshaped, acute, pungent. Galbule subglobose, not exceeding the leaves, 3-tuberculate at the apex, purplish-black, pruinose.

SUB-SPECIES I.—**Juniperus eu-communis.**

PLATE MCCCLXXXII.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXXXV. Fig. 1141.

Billot, Fl. Gall. et Germ. Exsicc. No. 243.

J. communis, *Willd.* *Auct. Plur.*

J. communis, var. *α*, *Hook. & Arn.* Brit. Fl. ed. viii. p. 420. *Benth.* Handbk. Brit.

Fl. ed. ii. p. 431. *Fries*, Summ. Veg. Scand. p. 59.

Erect. Leaves when mature spreading, straight, strapshaped, channeled, insensibly attenuated to the pungent apex. Galbule subglobular, much shorter than the leaves.

On downs, heaths, hills, and woods. Local, but widely distributed. In England it is common in chalk and limestone districts; common on moors and the lower parts of mountains in the north. Local, but widely distributed in Ireland.

England, Scotland, Ireland. Shrub. Early Summer.

An erect much branched shrub, 2 to 4 feet high, or rarely more, with very numerous spreading branches, and brown flaky bark, the young shoots very much angulated. Leaves very numerous, $\frac{1}{4}$ to $\frac{3}{4}$

inch long, spreading nearly horizontally, except at the apex of the shoots, those at the base of each shoot much shorter and more boat-shaped than the others, glaucous above, except on the margins. Flowers diœcious, axillary, minute, with imbricated scarious brown bracts at the base of the catkins. Galbules the size of small peas, green until they have attained their full size, after which they do not ripen till the autumn of the year succeeding in which they were formed, when they become purplish-black with a white bloom like that on the sloe. Seeds trigonous, brown, unequal.

Common Juniper.

French, *Genévrier commun*. German, *Gemeiner Wachholder*.

The juniper, which is an evergreen shrub, is common in all the northern parts of Europe, both in fertile and barren soils, but it abounds on chalk downs and limestone hills. On the sides of hills its trunk grows tall, but on the tops of rocky mountains and in bogs it is only a shrub. The juniper is mentioned in the Bible, in the First Book of Kings, as the tree under which the prophet Elijah took refuge in the wilderness of Beersheba, when fleeing from the persecutions of King Ahab. It was known to the Greeks, who used its berries medicinally, though they thought its shade unwholesome. Pliny says the juniper has the same properties as the cedar, adding that in his time it grew in Spain to a great size, but that wherever it grows its heart is always sound. He says that a piece of juniper wood, if ignited and covered with ashes of the same wood, will keep on fire for a whole year. The botanists of the middle ages appear to have had a high opinion of the virtues of the common juniper. Tagus asserts that its berries will cure all diseases, and Mathioli that its virtues are too numerous to mention. Turner, as quoted by Mr. London, says, "The juniper groweth most plenteouslie in Kent; it groweth also in the bisshopryche of Durraim, and in Northumberlande. It groweth in Germany in greate plentye, but in no place in greater than a lyttle from Bow, where at the time of year the feldefares fede only of juniper's berries, the people cate the feldefares undrawn, with guttes and all, because they are full of the berries of the juniper." Culpepper says, "This admirable bush is scarce to be parallel'd for his vertues," and he then enumerates a list of diseases which the berries will cure long enough to tire the most credulous. Gerarde says, "It is most certain that the decoction of these berries is singular good against an old cough, and against that with which children are now and then troubled, called the chincough." He adds, "Divers in Bohemia do take, instead of other drinke, the water wherein those berries have been steeped, who live in wonderfull good health." He says also, "The smoke of the leaves and wood drives away serpents and all infection and corruption of the air, which bring the plague or such like contagious diseases. The juice of the leaves is laid on with wine, and also drunke, against the bitings of the viper." The wood is finely veined, of a reddish yellow tint, and very aromatic. It is valuable for veneering, and for turning cups and other small articles; the smaller stems make good walking-sticks. It makes excellent fuel, and in Scotland and Sweden is used for smoking hams. The bark is made by the Laplanders into ropes. The berries are, however, the most useful product of the juniper. Many kinds of birds feed on them, and, when crushed and distilled, they yield an essential oil. In Holland, and to a certain extent in this country, they are used to flavour gin. In some parts of France a kind of beer is made from the berries with barley, called *genévrette*. It is bright, sparkling, and is said to possess diuretic properties. The common name *gin*,

given to our well-known liquor, is a corruption of the French word *genèvre*, an infusion of juniper berries. It was formerly supposed that the juniper, when grown in hot countries, produced the substance called gum sandarach, which, when powdered, is called pounce; but it is now discovered that this gum is the produce of *Callitris quadrivalvis*, or the *Thuja* or *Arbor Vitæ* of the ancients. From a foreign species of juniper is obtained the resin called olibanum, used as incense; and another variety of juniper is the pencil cedar. In the Highlands juniper is the badge of the clan Murray. In countries where juniper abounds, such as Norway and Sweden, the sprays are strewed over the floors of rooms, on account of the agreeable odour they diffuse. They are said also to promote sleep. Boccaccio alludes to such a custom as essential to paradisaical enjoyment; and in former ages, though rushes were commonly used to strew over floors, juniper was reserved as a luxury for high festivals or the most opulent. Virgil warns us against trusting to the seductive influence of the "juniperi gravis umbra:"—

"Juniper's sweet shade, whose leaves around
Fragrance diffuse, at eve are noxious found."

The ancients consecrated the juniper to the Furies, and threw its berries on the funeral pile, to protect the departing spirit from evil influences. They also sacrificed it to the infernal gods, to whom they believed its perfume was acceptable, and burnt it in their dwelling-houses to keep away demons. A similar custom prevails in some parts of the Continent, where the peasants believe that burning juniper branches before their doors will prevent the incantation of witches, and drive away evil spirits. It is probably in allusion to this belief that Sir Walter Scott says, in the "Lady of the Lake":—

"A heap of wither'd boughs was piled,
Of juniper and rowan wild,
Mingled with shivers from the oak
Rent by the lightning's recent stroke."

The juniper bush was at one time much employed in topiary work, and Evelyn mentions that his brother had an arbour which three persons could sit in, cut out of a single plant. This arbour was seven feet wide, and eleven feet high. The juniper is occasionally still seen in modern gardens, trained and clipped into the form of an open bowl or goblet.

SUB-SPECIES II.—*Juniperus nana*. Willd.

PLATE MCCCCLXXXIII.

Reich, Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXXXV. Fig. 1142.

Billot, Fl. Gall. et Germ. No. 3472.

J. communis, var. *nana*, *Hook. & Arn.* Brit. Fl. ed. viii. p. 420. *Benth.* Handbk.

Brit. Fl. ed. ii. p. 431. *Fries.* Summ. Veg. Scand. p. 59

J. alpina, *Clus.* *Gren. & Godr.* Fl. de Fr. Vol. III. p. 157.

Procumbent or prostrate. Leaves when mature imbricated-incurved, strapshaped, boatshaped, abruptly acuminate at the pungent apex. Galbule ovoid-globular, about as long as the leaves.

On rocks and heathy places on mountains. Rare in the south,

where it occurs in Wales. Common in the north, extending to Orkney and Shetland. Frequent on the Irish mountains.

England, Scotland, Ireland. Shrub. Summer, early Autumn.

Perhaps not hereditarily distinct from *J. eu-communis*, with which it is more or less completely connected by intermediate forms. It has, however, a very different aspect from its procumbent habit and incurved boatshaped leaves, which are commonly about $\frac{1}{4}$ inch long, and rarely exceed $\frac{1}{2}$ inch. The berries are rather longer, but about the same size as those of *J. eu-communis*, but from the leaves being much shorter they generally equal, and sometimes even slightly exceed, the leaves.

Alpine Juniper.

German, *Zwerg Wachholder*.

SUB-ORDER III.—TAXINEÆ.

Male flowers in catkins. Female flowers solitary, terminal, not in the axil of a scale, commonly with the apex or opening of the ovule superior. Fruit consisting of a naked seed, surrounded by a fleshy cuplike disk.

GENUS I.—TAXUS. *Tournef.*

Flowers diœcious. Male flowers in small globular solitary or twin axillary catkins, reduced to naked stamens: anther-cells 3 to 8, attached to the edges of peltate lobed scales (connective?). Female flowers solitary, with scaly bracts at the base, reduced to an erect sessile ovule, surrounded by a disk, not produced into a tube at apex. Fruit a bony nutlike seed, the apex of which appears above the much enlarged fleshy or juicy red disk, which resembles a drupe with the apex of the fleshy portion deficient. Seed ovoid, not winged with a bony testa; albumen fleshy-farinaceous; cotyledons 2; radicle superior.

Evergreen trees with scaly buds and scattered more or less bifarious rigid strapshaped leaves. Wood cells with spiral markings as well as the disks proper to the Coniferæ.

The name of this genus of plants is derived from *τόξον* (*toxon*), a bow, being formerly much used in making these instruments; or from *taxis*, arrangement, from the leaves being arranged on the branches like the teeth of a comb; or from *toxicum*, poison; though Pliny says that poison (*toxicum*) was so named from this tree, which was considered poisonous.

SPECIES I.—**TAXUS BACCATA.** *Lin.*

PLATE MCCCLXXXIV.

Reich. Ic. Fl. Germ. et Helv. Vol. XI. Tab. DXXXIII. Fig. 1147.

Leaves numerous, paler and yellowish beneath, slightly reflexed, strapshaped, abruptly acuminate. Flowers sessile, axillary.

Var. *α*, *vulgaris*.*T. baccata*, *Lindley*, *Syn. Brit. Fl.* p. 241.

Branches spreading. Leaves bifarious.

Var. *β*, *fustigiata*.*T. fustigiata*, *Lindley*, *Syn. Brit. Fl.* p. 241.

Branches suberect. Leaves pointing in all directions.

On rocks, especially of limestone, chalky banks, and in woods. Widely distributed in England and the southern half of Scotland, but probably not native in the latter country, unless it be so at Glenure, Upper Lorn, Argyle, where Lightfoot states that, in 1777, there were the remains of an old wood of yew trees. Rare, but truly native in the north and west of Ireland. Var. *β* is the Irish or Florence Court yew, and is perhaps a monstrosity rather than a variety, as only two trees of it have ever been found wild, these were found near Florence Court, co. Fermanagh.

England, Scotland (?), Ireland. Tree. Spring.

An erect tree of no great height, but often with a very thick trunk and long spreading branches. Leaves, though inserted all round the twigs, spreading right and left, $\frac{1}{2}$ to $1\frac{1}{2}$ inch long, dark, glossy green above, dull yellowish green below, somewhat fleshy, terminated by a short, weak, not pungent point. Flowers diœcious. Male flowers in minute subglobose yellowish catkins. Female flowers with greenish bracts at the base. Fruit formed by the enlargement of the disk, the size of a large pea or small black currant, somewhat cylindrical, about as long as broad, truncate and excavated at the apex, where the naked seed is exposed, bright red, dim, with a thin skin containing an abundance of slimy juice. Seed about the size of a sweet pea, placed in the enlarged fleshy berrylike cup, olive-brown, roundish-ovoid, compressed, coarsely punctured.

The var. *β* has the leaves of a darker green, and is very different in habit from the common yew. Only the female plant of it is known, which produces seed when fertilised by the pollen of the common yew, but the offspring of this crossing are said to be always var. *α*.

Common Yew.

French, *If commun.* German, *Gemeine Eibe.*

The derivation of the common name of this tree is variously given by different authors. In Chaucer and other old authors it is spelt *eue*, and Dr. Prior considers that it is a corruption or abbreviation of *ajuga*, and to have been mistaken for the black cypress. Some writers say it is derived from the Celtic word *iw*, sometimes pronounced *if*, and signifying verdure, alluding to the yew being an evergreen; and this will also explain the French name *if*.

The yew and its use for making bows are mentioned by the earliest Greek and Roman authors, and its poisonous properties are pointed out by Dioscorides, Nicander, Galen, Pliny, and others. Theophrastus says that the leaves will poison horses. Cæsar mentions that Cativolcus, king of the Eburones, poisoned himself with the juice of the yew. Suetonius asserts that the Emperor Claudius published an edict, stating that the juice of this tree had marvellous power in curing the bite of vipers. Plutarch says it is venomous when in flower, because then the tree is full of sap, and that its shade is fatal to all who sleep under it. Pliny adds that the berries of the male yew are a fatal poison, particularly in Spain, and that persons have died who have drunk wine from casks made of this wood. In more modern times Mathiolum and J. Bauline were the first to prove, by positive facts, the poisonous nature of the leaves of the yew; but Father Schoot, a Jesuit, asserted that if the branches were dipped in stagnant water, their poison became neutralised. Gerarde and L'Obel soon afterwards discovered that the fruit of the yew might be eaten with perfect safety, and there was no danger in sleeping under its shade. Gerarde, after stating the opinions of the ancients as to the poisonous nature of the yew, writes, "All which, I dare boldly affirm, is untrue; for when I was young and went to schoole, divers young schoolfellows, and likewise myself, did eat our fils of the berries of this tree, and have not only slept under the shadow thereof, but among the branches also, without any hurt at all, and that not one time, but many times." Nicander, in his book of counter-poisons, as quoted by Gerarde, says:—

"Shun the poy's'nous yew, the which on Olta grows;
Like to the firre, it causeth bitter death.
Unless besides they use pure wine that flows
From empty'd cups, thou drinke, when as thy breath
Begins to faile, and passage of thy life
Growes straight."

The wood of the yew is beautifully shaded with reddish orange and dark brown, and is extremely tough and elastic, qualities that recommended it in former ages as the best material for the long bow, the dreaded weapon of our forefathers. It was fatal to several British kings—viz. Harold, at the battle of Hastings; William Rufus, in the New Forest; and Richard Cœur de Lion, at Limoges, in France. In the battles of Cressy, Poitiers, and Agincourt the strong bows of yew achieved the victory. In 1397 Richard II., holding a Parliament in a temporary building, on account of the wretched state of Westminster Hall, surrounded his hut with 4,000 Cheshire archers, armed with tough yew bows, to ensure the freedom of debate. Numerous statutes were enacted to secure a supply of this valuable wood, and the exportation of it was forbidden. When the trees of native growth were insufficient, large quantities were brought from abroad.

The trunk of the tree appears to have been the part chiefly used in bow-making; for Roger Ascham, in his "*Toxophilus*," says that the boughs, though sometimes employed, were "knotty and full of priunes," and recommends the archer to provide himself with a bow made from the bole or trunk. The last statute that appears in the books respecting the use of the yews for bows is the 13th of Elizabeth, which directs that bow-staves shall be imported into England from the Hanse Towns and other places. In Switzerland, where the yew tree is scarce, it was forbidden, under heavy penalties, to cut down the tree for any other purpose than to make bows of the wood. The Swiss mountaineers call it "*William's tree*," in memory of William Tell. Now, when the rifle has taken the place of the bow in the hands of the British soldier, and the formidable weapon of our ancestors has become a mere toy, the ancient value of yew is forgotten; but the wood, though scarce, is not unfrequently employed by the turner and cabinet-maker for their finer work, and, when well veined, fetches a high price. It is universally allowed to be the finest European wood for cabinet-making purposes. Tables made of yew, when the grain is fine, according to Gilpin, are more beautiful than tables of mahogany, and the colour of its root is said to vie with the ancient citron. The sap-wood, though of as pure a white as the wood of the holly, is easily dyed of a jet black, when it has the appearance of ebony. Where it is abundant it is valued for works under ground, such as water-pipes, pumps, piles, &c. The yew will last longer than any other wood. "Where your paling is most exposed either to wind or springs," says Gilpin, "strengthen it with a post of old yew." It is a common saying among the inhabitants of the New Forest, that a "post of yew will outlast a post of iron." Evelyn mentions the yew trees at Box Hill as both numerous and large. Marshall, writing in 1796, says that a few of these trees which remained had then lately been taken down, and the timber of such as were sound was sold to the cabinet-makers at very high prices for inlaying; one tree in particular was valued at 100*l.*, and half of it was actually sold for 50*l.* The least valuable were cut up into gate-posts, which are expected to last for ages. Even stakes made from the tops of yew have been known to stand for a number of years. Boucher mentions one of the uses to which the wood is applicable, which ought to recommend it to all cabinet-makers—that the wooden parts of a bed made of yew will most certainly not be approached by bugs. "This is a truth," he adds, "confirmed to me by the experience of trees I had cut down and used myself in that way." The accounts we have of the making of bows in England in early times are very interesting. In the time of the Saxons, yew bows the height of a man were brought over by Vortigern, and soon became general, till, according to one of the versifiers of the fifteenth century, the enemies of England in every country,

"By shafts from bows of bending yew,
In streams of crimson gore paid nature's due."

Mr. Loudon tells us that in the reign of Henry VII. "Prince Arthur held sports of archery at Mile End, when there was created, in jest, a Duke of Shoreditch, and two Marquesses of Clerkenwell and Islington, and an Earl of Pancras. The Duke of Shoreditch was the best archer in the king's guard, and the others the next best. These dignitaries played their parts like the king and queen on Twelfth Night, and a full detail of the ceremonies will be found in Wood's "*Bowman's Glory*." In 1544 Roger Ascham published his "*Toxophilus*," a work replete with the quaint learning and involved sentences of the time. He gives directions for choosing a bow, and learning the art of using it. Of materials for making the bow, he gives decided preference to the yew. In his time a good bow consisted of a single piece of wood,

commonly yew, from four feet to six feet long, without any felt wrapped round the middle of it to stay the hand, as is done at present. There were, however, two pieces of horn, one at each end, to retain the string, which resembled those now in use. The best wood for the arrows is ash, and the next best birch or hornbeam. The manufacturers of bows were called *bowyers*, and the arrow-makers *fletchers*; hence surnames very common in England to this time. These manufacturers petitioned Queen Elizabeth in 1570 to enforce in their favour a statute that every man should have a bow in his house. She did so, and butts were erected in different places, such as Newington Butts, where every able-bodied man was enjoined to practise the art of shooting the bow. When yew could no longer be obtained of sufficient size to make an entire bow, it struck a bowyer of Manchester of the name of Kelsal, about the end of the sixteenth century, that he might make the back of the bow of another kind of wood, retaining the belly of yew. Ash, elm, and several other woods were used for this purpose, and at last backed bows became so common as almost to supersede the use of self-bows, as those were called made of a single piece.

The fruit of the yew is applied to no use in Britain, though the kernel of the nut may be eaten, and it is said to afford, by expression, an oil which is good for fattening poultry. Although the fruit of the yew is harmless, the leaves are not so, and serious accidents have resulted from their use. Dr. Taylor, in his work on Poisons, enumerates several fatal cases which have been caused by the infusion of yew leaves being given to children as a vermifuge. He also mentions a case where the berries acted poisonously, as published by Mr. Hart, of Mansfield. If this be so, the testimony of our friend Gerard is not of much value. Dr. Taylor says, "There is no doubt that the yew is a powerful poison of the narcotic-irritant class. The nature of the poisonous principle is unknown, nor is it certain whether, in respect to the berry, the poison is lodged in the pulp or the seed." In the register of deaths for 1838, and again in 1840, there appear two cases of females dying from partaking of yew leaves or berries. Mr. Knight, finding that wasps prefer the fruit of the yew to that of the vine, suggests the idea of planting female yews near the vineries. The use of the yew in ancient topiary gardening was very extensive in England and France in the seventeenth century. The practice was rendered fashionable by Evelyn, previously to which the clipping of trees as garden ornaments was chiefly confined to plants of box, juniper, &c., kept by the commercial gardeners of the day in pots and boxes, and trained for a number of years till the figure required was complete. Sometimes clipped plants of this sort sold for as much as five guineas each.

The custom of planting yew trees in churchyards and cemeteries has never been satisfactorily explained. Some have supposed that the yew trees were placed near the churches for the purpose of affording branches on Palm Sunday; others, that they might be safe from cattle, on account of their value in making bows; others, that their sombre colour and appearance were emblematical of silence and death; and others, that they were useful in affording shelter to those who came too soon for service. Mr. Loudon quotes an article from the pen of Mr. J. E. Bowman in the "Magazine of Natural History," in which he says, "It seems most natural and simple to believe that, being indisputably indigenous, and being, from its perennial verdure, its longevity, and the durability of its wood, at once an emblem and a specimen of immortality, its branches would be employed by our Pagan ancestors, on their first arrival here, as the best substitute for the cypress, to deck the graves of the dead, and for other sacred purposes." As it is the policy of innovators in religion to avoid unnecessary interference with matters not essential, these, with many other customs of heathen origin, would be retained and engrafted on Christianity on its first

that the yew was also closely connected, in the superstitions of our simple forefathers, with ghosts and fairies. In the works of a very ancient Welsh bard we are told of two churches renowned for their prodigious yew trees, "the minster of Esgor and that of Heùllan, of celebrity for sheltering yews." Heùllan signifies an *old grove*, thus proving that its church stood where Druid worship had been performed. Can we, then, longer doubt the real origin of planting yew trees in our churchyards? If it be said that this usual though not natural situation of the yew tree proves the venerable specimens which we find in churchyards not to be older than the introduction of Christianity, it may be replied that our earliest Christian churches were generally erected on the site of a heathen temple, and that at least one motive for placing churches in such situations would be their proximity to trees already sacred, venerable for size, and indispensable in their religious rites. That these rites were performed, and altars erected in groves from the remotest antiquity, we know from the Pentateuch. The devotions and sacrifices of Baal among the Moabites, and the idolatrous rites of the Canaanites and other tribes of Gentiles, were performed in groves and high places. The Druids chose for their places of worship the tops of wooded hills, where, as they allowed no covered temples, they cleared out an open space, and there erected their circles of stone. Many of the remote Welsh churches are on little eminences among wooded hills. Mr. Rootsey, of Bristol, has suggested "that our words kirk and church might probably have originated in the word *cerrig*, a stone or circle of stones, the first churches having been placed within these circular stone enclosures." The Rev. W. T. Brce suggests, in the "Magazine of Natural History," that churches were built in yew groves, or near large old yew trees, as more likely than that the yews were planted after the churches were built.

The practice of clipping the yew into geometrical forms in gardens was most prevalent from the time of Charles I. to the latter end of William III., when it gradually gave way. In some of the old college gardens at Oxford, and in some old private gardens in various parts of England, these curious figures, niches, arcades, or pilasters may still be seen. It may be mentioned as a historical fact that De Candolle adopted the yew tree as a sort of standard by which to determine the age of trees generally from the number of layers of wood in their trunks. The reasons why he appears to have preferred the yew are, that of this tree there are a greater number of authentic records of the age of individual specimens than of most other trees, and because the wood is of slower growth and greater durability than that of any other European tree. The old name applied to those who carried arms, and were the trusty "*yeomen*" of olden times, seems to have been derived from the "Eugh" or "Yew," the archers of the period carrying bows of *yew*.

The yew has afforded numerous images to poets from the time of Homer, who speaks of the ancient inhabitants of Crete as being "dreadful with the bended yew." Virgil notices the elasticity of the yew in the "*Æneid*":—

"This foul reproach Acanius could not bear
With patience, or a vow'd revenge forbear.
At the full stretch of both his hands he drew,
And almost join'd the horns of the tough yew."

Herrick alludes to the presence of the yew in funeral obsequies in his address to the yew and the cypress:—

"Both of you have
Relation to the grave;

And where
 The fun'ral trump sounds you are there.
 I shall be made
 Ere long a fleeting shade ;
 Pray come,
 And do some honour to my tomb ;
 Do not deny
 My last request, for I
 Will be
 Thankful to you or friends for me."

Shakspeare mentions the yew as being used for bows :—

"The very beadsmen learn to bend their bows
 Of double fatal yew against thy State."

He also tells us that in the witches' cauldron in "Macbeth" one of the ingredients was "slips of yew;" and, alluding to its use in funerals, he says, "My shroud of white stuck all with yew."

Gray's lines in his "Elegy" are well known :—

"Beneath those rugged elms, that yew tree's shade,
 Where heaves the turf in many a mouldering heap,
 Each in his narrow cell securely laid,
 The rude forefathers of the hamlet sleep."

Wordsworth gives us a description of the yew which must be quoted :—

"There is a yew tree, pride of Lorton Vale,
 Which to this day stands single in the midst
 Of its own darkness, as it stood of yore,
 Not loth to furnish weapons in the hands
 Of Umfraville or Percy ere they marched
 To Scotland's heaths, or those that cross'd the sea
 And drew their sounding bows at Agincourt,
 Perhaps at earlier Cressy or Poitiers,
 Of vast circumference and gloom profound,
 This solitary tree! A living thing,
 Produced too slowly ever to decay ;
 Of form and aspect too magnificent
 To be destroyed. But worthier still of note
 Are those fraternal four of Borrowdale,
 Joined in one solemn and capacious grove ;
 Huge trunks ! and each particular trunk a growth
 Of intertwined fibres, serpentine,
 Upcoiling, and immediately convolved,
 Nor uninformed by phantasy and looks
 That threaten the profane ; a pillar'd shade
 Upon whose grassless floor of red-brown hue
 By sheddings from the pining umbrage tinged
 Perennially ; beneath whose sable roof
 Of boughs, as if for festal purpose decked
 With unrejoicing berries, ghostly shapes

May meet at noontide,
 There to celebrate,
 As in a natural temple scatter'd o'er
 With altars undisturbed of mossy stone,
 United worship."

There does not appear to be any mythological legend connected with the yew. It is said in Lemprière's "Dictionary" that Smilax was metamorphosed into a yew; but Ovid simply says that she and her lover Crocus were changed into two flowers. Loudon suggests that probably the mistake arose from Dioscorides and some other of the ancient botanists having called the yew Smilax. Camden relates a legend of a priest in Yorkshire who, having murdered a virgin who refused to listen to his addresses, cut off her head, and hid it in a yew tree. The tree from thenceforth became holy, and people made pilgrimages to visit it, plucking and bearing away branches of it, believing that the small veins and filaments resembling hairs, which they found between the bark and wood of the tree, were the hairs of the virgin. Hence the name of the village which was then called Houton was changed into Halifax, which signifies holy hair, and the wealth brought by the pilgrims enabled the inhabitants to build on its site the now famous town of that name. The yew is the badge of the Highland clan Fraser.

The yew trees of Fountains Abbey, in Yorkshire, are well known. This abbey was founded in 1132, by Thurston, Archbishop of York, for certain monks who adopted the severe discipline of St. Bernard. In the Royal Society is preserved a history of the foundation of this abbey as given by a monk of the period. He describes the locality as a spot of ground that had never been inhabited unless by wild beasts; being overgrown with wood and brambles, lying between two steep hills and rocks covered with wood on all sides, more proper for a retreat for wild beasts than the human species. There stood a large elm tree in the midst of the vale, on the lower branches of which the monks put some thatch and straw; and under that they lay, ate, and prayed, the bishop for a time supplying them with bread, and the rivulet with drink. But it is supposed that they soon changed the shelter of their elm for that of seven yew trees, growing on the declivity of the hill on the south side of the abbey, all standing in 1658, excepting the largest, which was blown down about the middle of the fifteenth century. These yews were then of extraordinary size, the trunk of one of them twenty-six feet six inches in circumference at three feet from the ground, and they stood so near each other as to form a cover almost equal to a thatched roof. Under these trees the monks resided till they had built their monastery.

The name of Fountains Abbey is derived by some from Fountaines, in Burgundy, the birthplace of St. Bernard; and by others from the word *shell*, which (signifying a fountain) was written in Latin by the monks *fontibus*; and thence corrupted into the present name. In 1837 one of these trees existed, and was sketched by an artist; it must then have been upwards of 800 years old.

The Fortingal Yew, in a churchyard amongst the Grampians, is of unknown age, and has long been a mere shell, forming an arch through which the funeral processions of the Highlanders were accustomed to pass. This tree has been considerably destroyed by the depredations of visitors, but is now secured by an iron railing. It is probable that it was a flourishing tree at the beginning of the Christian era, and may yet survive for centuries to come.

A large yew hedge existed in the Botanic Gardens at Oxford, which was rooted up

in 1834, and its branches were so completely entwined together that rustic chairs and other articles were made of them without nailing.

The Ankerwyke Yew, near Staines, is said to be upwards of 1000 years old. Henry VIII. was said to have made it his trysting place with Anna Boleyn when she was living at Staines; and Magna Charter was signed within sight of it, on the island in the Thames between Ankerwyke and Runnymede. The girth of this tree at three feet from the ground is twenty-seven feet eight inches; and at eight feet is thirty-two feet five inches.

“What scenes have passed since this ancient yew
In all the strength of youthful beauty grew!”

The Arlington or Harlington Yew stands in the churchyard of the village of that name, between Brentford and Hounslow. It is chiefly remarkable for its large size, and for its having been clipped into a regular pyramidal and fanciful form. It was surrounded by a wooden seat, and ten feet above that a large circular canopy is formed out of the tree itself, which was, according to the poet John Saxy, the parish clerk—

“So thick, so fine, so full, so wide,
A troop of guards might under it ride.”

Ten feet above this canopy was another, much smaller, above that a pyramid twenty feet high, and then a globe ten feet high, which was crowned by—

“A weathercock who gaped to crow it,
This world is mine, and all below it.”

The tree ceased to be clipped about 1780 or 1790, and soon regained its natural shape.

“Here patriot barons might have musing stood,
And plann’d the charter for their country’s good.”

Box Hill, in Surrey, was, in the time of Evelyn, as celebrated for its yews as for its box trees. In the churchyard at Queenswood near Tytherly, in Wiltshire, there are two yew trees which are above 500 years old; the largest is twenty-eight feet high, diameter of the trunk three feet six inches, and of the head fifty feet. There is, in the same wood, an avenue 414 yards long, consisting of 162 yew trees, which are supposed to be 200 years old. There are many other remarkable yew trees in Britain, most of which are noticed in Mr. Loudon’s “Arboretum;” and we can all recollect some favourite yew tree, which stands as it has ever done within our recollection, and with no evidence of growth or change in a period perhaps of half a century.

EXCLUDED SPECIES.

PINUS PINEA. *Linn.*

The cones of this are said to have occurred in the Irish bogs, but it is no longer wild or naturalised in Ireland.

ABIES EXCELSA. *D.C.*

The cones of this are also said to occur in the Irish bogs. (See Cyb. Hib. p. 277.)

JUNIPERUS SABINA. *Linn.*

Recorded by Dr. Molyneux to have been found by an apothecary on one of the islands of Lough Lane, Killarney. No doubt the plant found was some form of *Juniperus communis*. (See Cyb. Hib. p. 276.)

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ENGLISH BOTANY.

ILLUSTRATIONS.

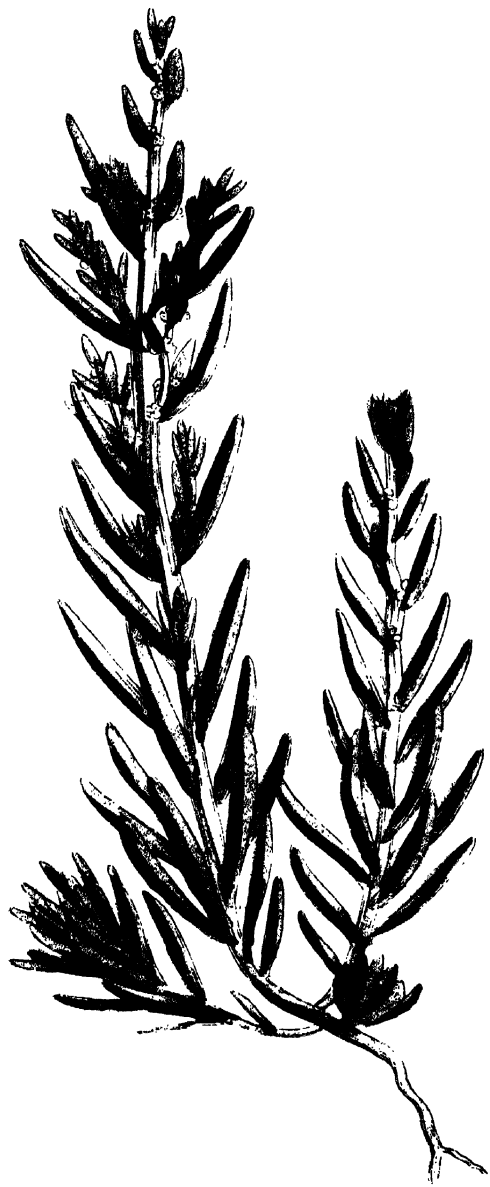
ERRATA.

Plate MCCCXV., *for* Salix Smithiana var. ferruginea, *read* Salix ferruginea.
" " " Silky-leaved Ozier, var. *B* " Ferruginous Ozier.
" MCCCCLXIV., " argentifolia " angustifolia.



E. B. 635.

Suaeda fruticosa. Shrubby Sea-blite.



E. B. 633.

Suæda maritima.

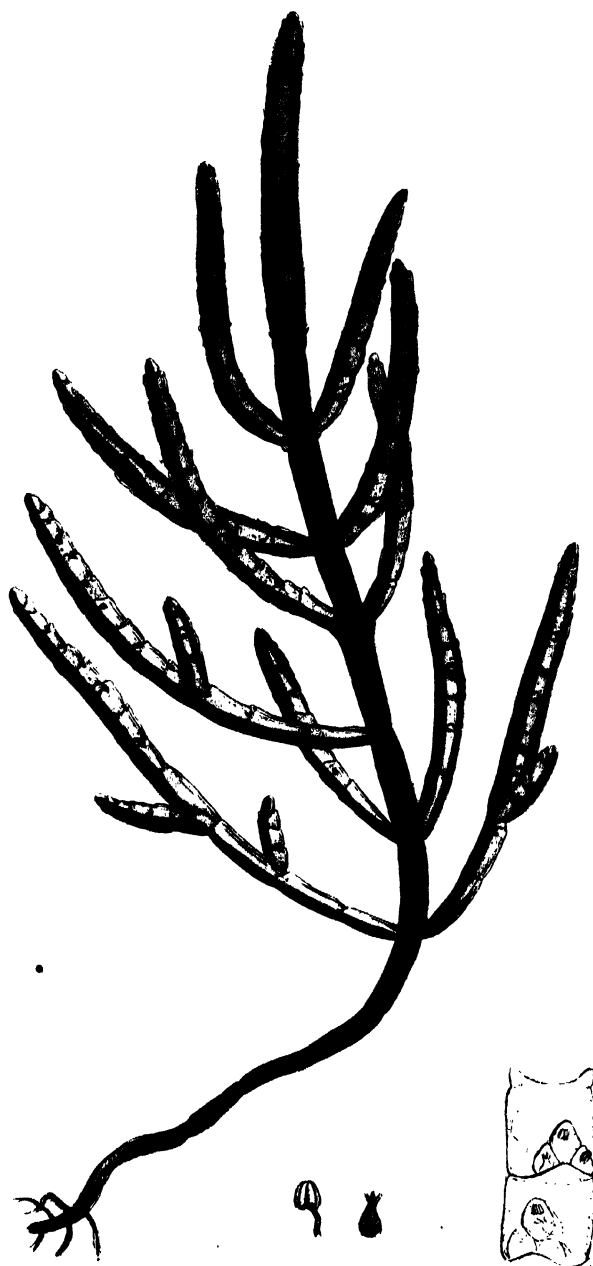
Annual Sea-blite.



E. B. 634.

Salsola Kali.

Prickly Saltwort.



E. B. 415.

Salicornia herbacea, var. *acetaria*.

Common Marsh-samphire, var. *a*.



E. B. 2475.

Salicornia herbacea, var. *procumbens*. Common Marsh-samphire, var. β



Salicornia radicans. Creeping Marsh-samphire.



E. B. 285.

Beta maritima. Sea Beet.



E.B. 1480.

Chenopodium polyspermum, var. *genuinum*. Many-seeded Goosefoot, var.



E. B. 1481.

Chenopodium polyspermum, var. *acutifolium*.

Many-sided Goosefoot, var. β .





E.B. 1723.

Chenopodium album, var. *candidans*. White Goosefoot.



Chenopodium album var. *viride*.

Green Goosefoot, var. *a*.



Chenopodium album var. *paganum*.

Green Goosefoot, var.



Chenopodium ficifolium.

Fig-leaved Goosefoot.



E. B. 1722.

Chenopodium murale

Nettle-leaved Goosefoot.



E. B. 1919.

Chenopodium hybridum. Maple-leaved Goosefoot.



E. B. 717.

Chenopodium urbicum. Upright Goosefoot.



E. B. 2247.

Chenopodium botryoides.

Many-clustered Goosefoot.



E.B. 1721.

Chenopodium eu-rubrum, var. *genuinum*.

Red Goosefoot, var. *a.*



Chenopodium eu-rubrum, var. *pseudo-botryoides*. Red Goosefoot, var.



E. B. 1454.

Chenopodium glaucum. Oak-leaved Goosefoot.



E. B. 1033.

Chenopodium Bonus-Henricus. Allgood.



Atriplex littoralis, var. *genuina*.

Grass-leaved Sea Orache, var. *a*.



E. B. 708.

Atriplex littoralis, var. *marina*.

Grass-leaved Sea Orache, var.





E. B. 2223.

Portulaca oleracea, var. *erecta*.

Narrow-leaved Orache, var. *♀*.







E. B. 936.

Atriplex Smithii. Smith's Orache.



E. B. S 2880.

Atriplex Babingtonii. Babington's Orache.



E.B. 165.

Atriplex arenaria. Frosted Sea Orache.



E. B. 261.

Atriplex portulacoides. Sea Purslane.



E. B. 232.

Atriplex pedunculata. Stalked-fruited Sea Orache.



E. B. 724.

Rumex conglomeratus. Sharp Dock.



E. B. 1533.

Rumex sanguineus.

Bloody-veined Dock.



E. B. 725.

Rumex maritimus. Golden Dock.



Rumex palustris. Yellow Marsh Dock.



E. B. 1576.

Rumex pulcher. Fiddle Dock.



E. B. 1999.

Rumex obtusifolius. Broad-leaved Dock.



E. B. S. 2757.

Rumex pratensis. Meadow Dock.

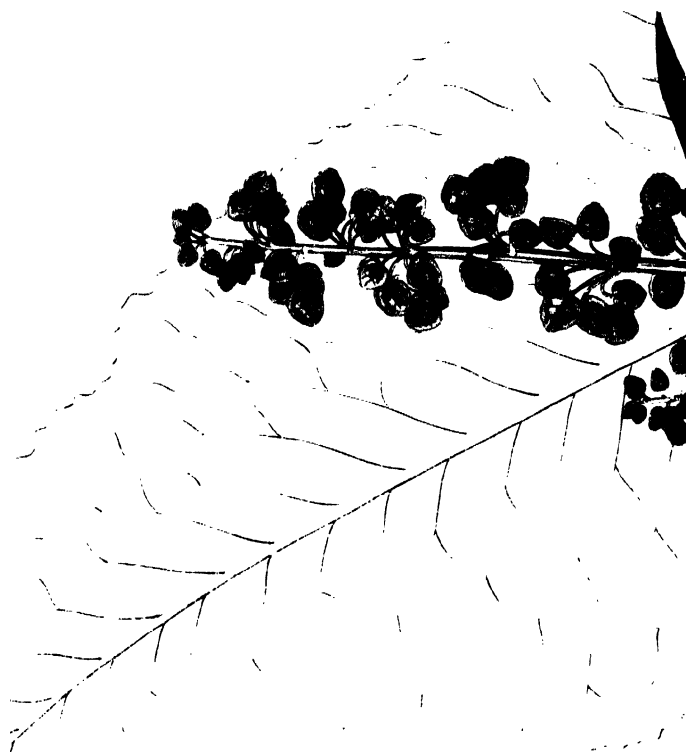


Rumex conspersus. Hartman's Dock.



E. B. 1998.

Rumex crispus. Curled Dock.







E. B. 2104.

Rumex Hydrolapathum. Great Water Dock.





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Rumex scutatus. French Sorrel



E. B. 127.

Rumex Acetosa. Common Sorrel.



E. B. 1674.

Rumex Acetosella. Sheep's Sorrel.



E. B. 910.

Oxyria reniformis. Kidney-shaped Mountain Sorrel.

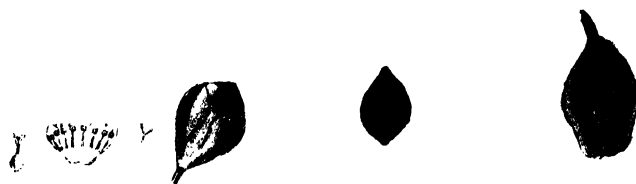


E. B. 1044.

Polygonum Fagopyrum. Common Buckwheat.



E. B. 941.



Polygonum Convolvulus. Climbing Buckwheat.



E. B. S. 2811.

Polygonum dumetorum. Cope Buckwheat.



E. B. 1252.

Polygonum aviculare, vulgatum.

Common Knot-grass (form 2).



Polygonum aviculare, arenastrum.

Common Knot-grass (form 3).



Polygonum aviculare, *rurivagum*.

Common Knot-grass (form 5).



E. B. S. 2805.

Polygonum Raii. Ray's Knot-grass.



E. B. S. 2804.

Polygonum maritimum. Sea Knot-grass.



E. B. 989.

Polygonum Hydropiper. Water Pepper.



E. B. 1043.

Polygonum minus. Small Persicaria.



E. B. S. 2867.

Polygonum mite. Lax-flowered Persicaria.



Polygonum Persicaria, var. *genuinum*. Spotted Persicaria, var. *a.*





E. B. 1382.

Polygonum lapathifolium, var. *genuinum*.

Glandular *Persicaria*, var. *g*



E. B. S. 2822.

Polygonum lapathifolium, var. *nodosum*.

Glandular Persicaria, var. β .



Polygonum amphibium, terrestre. Amphibious Bistort, terrestrial form.



436.

Polygonum amphibium, natans.

Amphibious Bistort, aquatic form.



E. B. 509.

Polygonum bistorta. Common Bistort.



E. B. 669.

Polygonum viviparum. Viviparous Bistort.



E. B. 425.

Hippophæe rhamnoides. Sea Buckthorn.



E. B. 1381.

Daphne Mezereum. *Mezereon.*



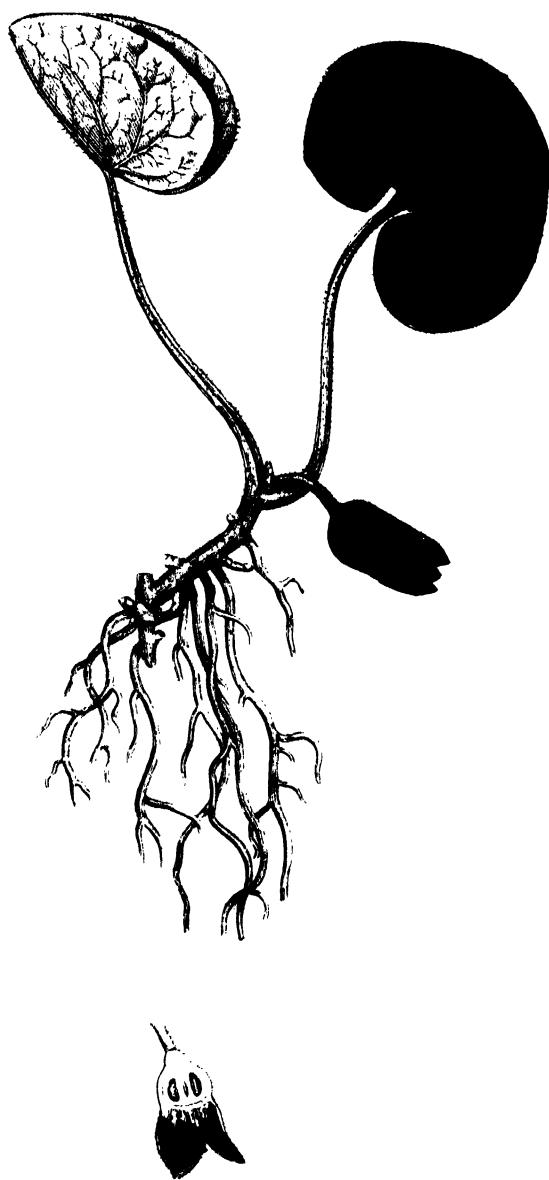
E. B. 119.

Daphne Laureola. Spurge Laurel.



E. B. 247.

Thesium humifusum. Bastard Toadflax.



E. B. 1083.

Asarum Europæum. *Asarabacca.*



E. B. 398.

Aristolochia Clematitis. Common Birthwort.



E. B. 526.

Empetrum nigrum. Crow-berry.

•



E. B. 1341.

Buxus sempervirens. Common Box.



E.B. 2002.

Euphorbia Peplis. Purple Spurge.



E. B. 883.

Euphorbia Helioscopia. Sun Spurge.



E. B. 333.

Euphorbia platyphylla. Broad-leaved Warty Spurge.



E. B. S. 2974.

Euphorbia stricta. Bushy Warted Spurge.



E. B. 1337.

Euphorbia hiberna

Irish Spurge.



E. B. S. 2787.

Euphorbia pilosa. Downy Spurge.



E. B. S. 2837.

Euphorbia coralloides. Coral Spurge.



E. B. 256.

Euphorbia amygdaloides. Wood Spurge.



E. B. 1399.

Euphorbia Esula. Leafy-branched Spurge.



E. B. 840.

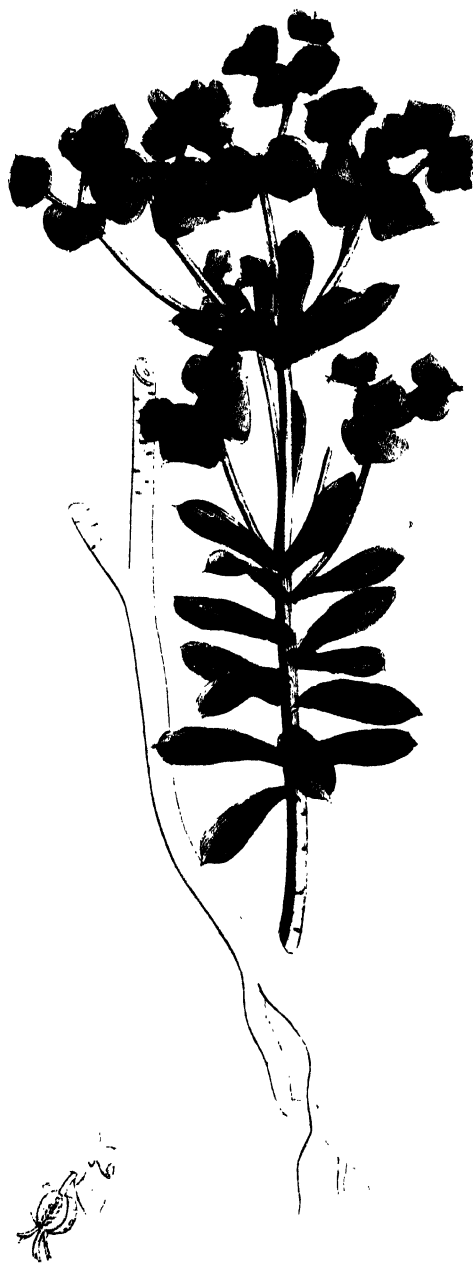
Euphorbia Cyparissias. Cyprus Spurge.



E. B. 195.

Euphorbia Paralias. Sea Spurge.

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E. B. 441.

Euphorbia Portlandica. Portland Spurge.

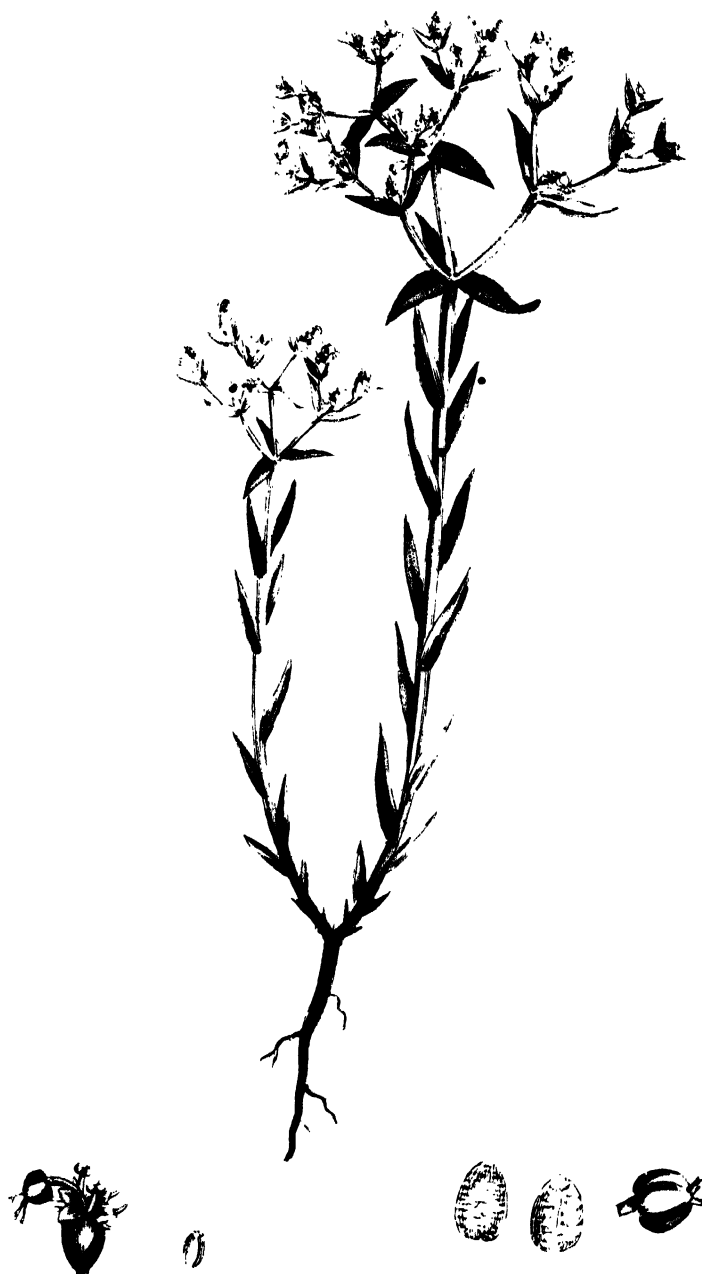


E. B. 959.

Euphorbia Peplus. Petty Spurge.

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E. B. 1336.

Euphorbia exigua. Dwarf Spurge.



2255.



Euphorbia Lathyris.

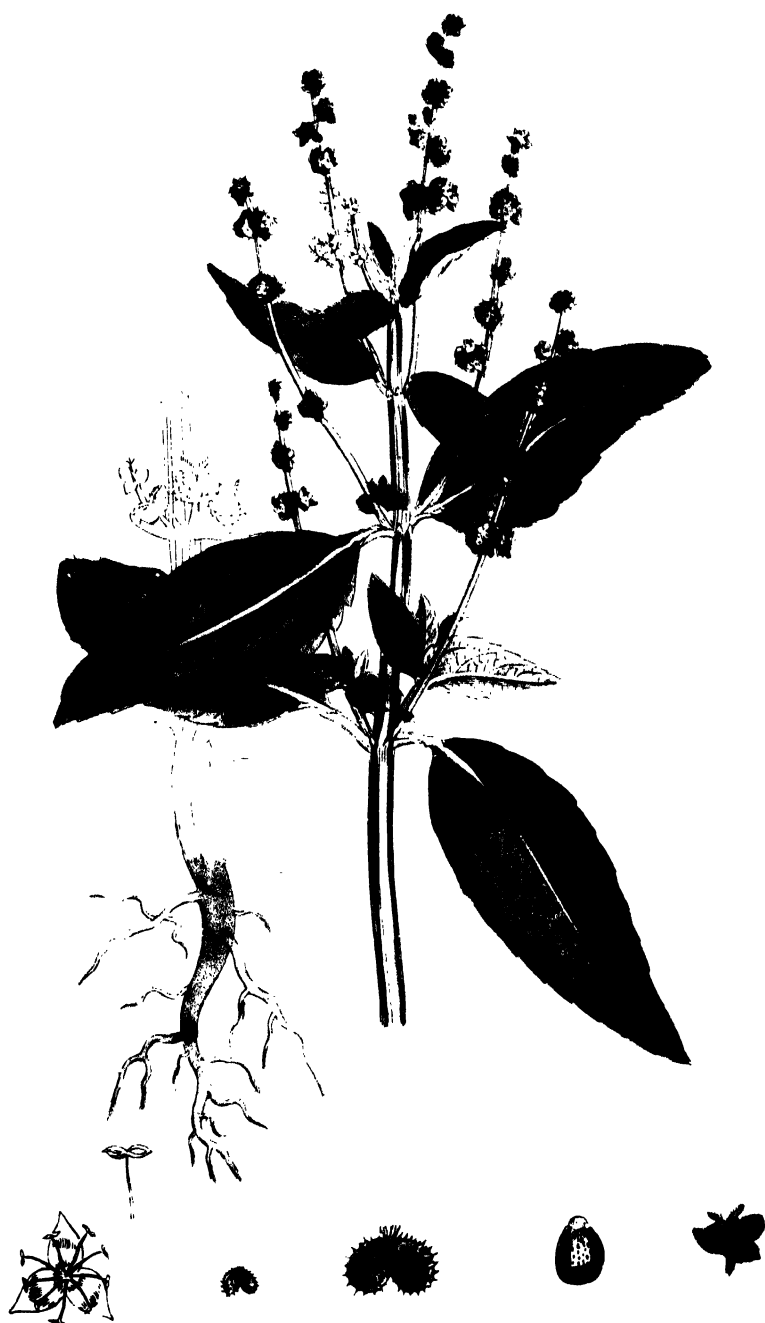


Caper Spurge.



E. B. 1872.

Mercurialis perennis. Perennial Dog's Mercury.



E. B. 559.

Mercurialis annua, var. *genuina*. Annual Dog's Mercury, var. *a*.



E. B. S. 2816.

Mercurialis annua, var. *ambigua*.

Annual Dog's Mercury, var. β .



E. B. 722.

Callitriche eu-verna.

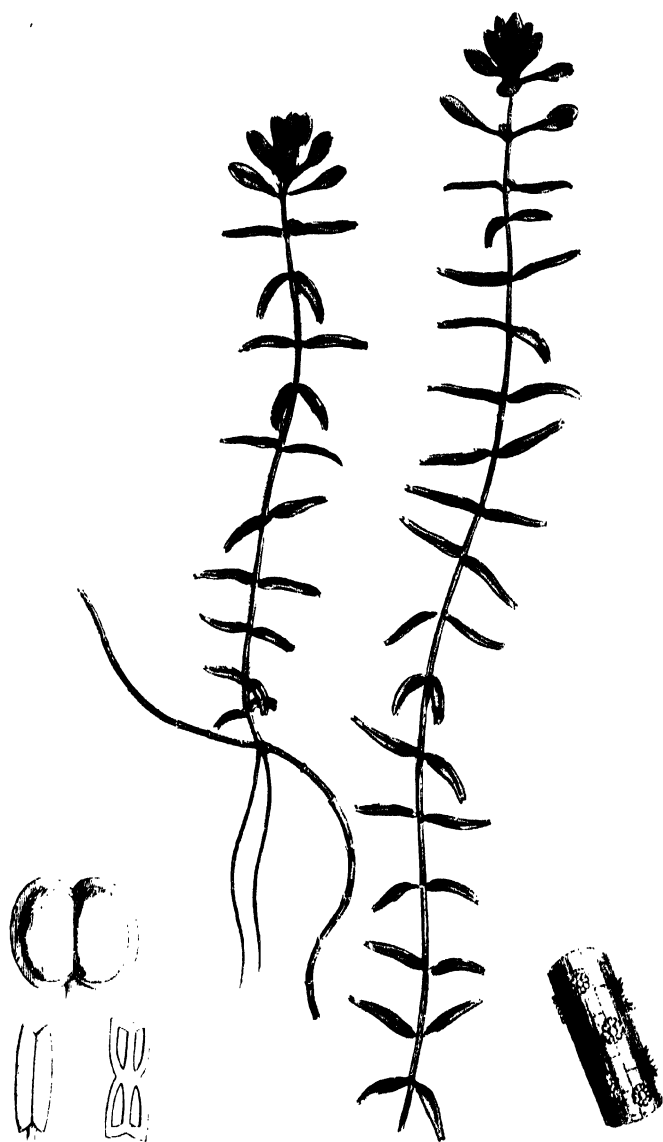
Vernal Water Starwort.



E. B. S. 2864.

Callitriche platycarpa.

Large-fruited Water Starwort.



Callitriche hamulata. Hooked Water Starwort.



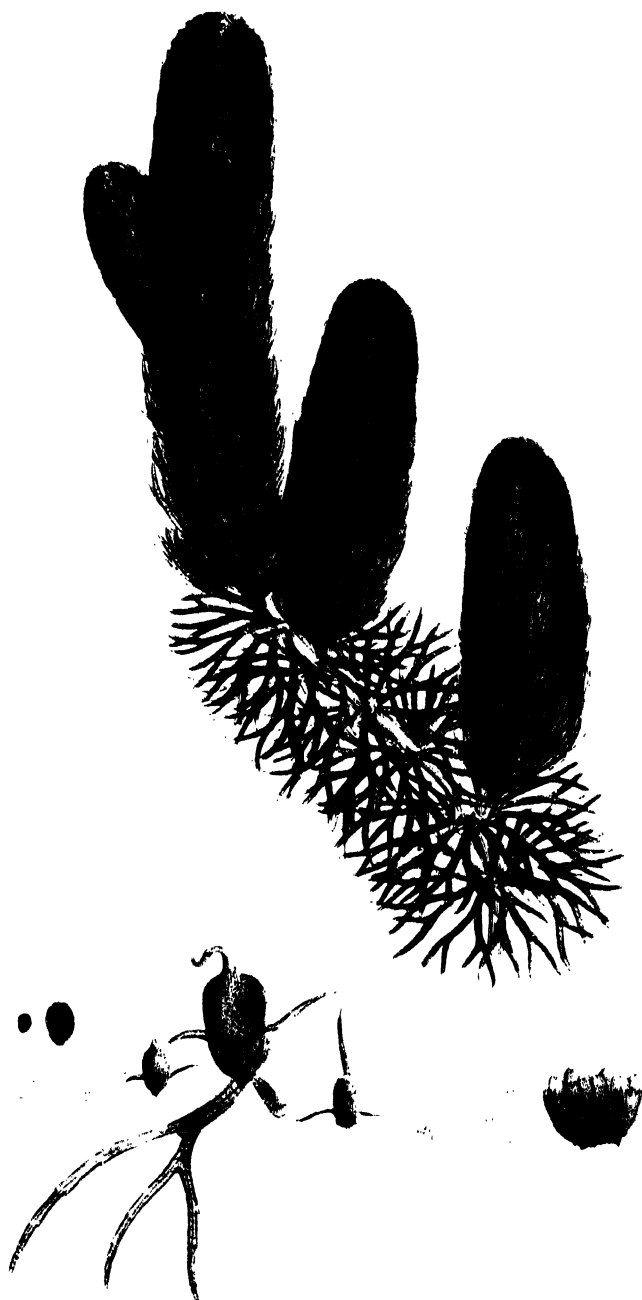
E. B. S. 2606.

Callitriche pedunculata. Pedunculated Water Starwort.



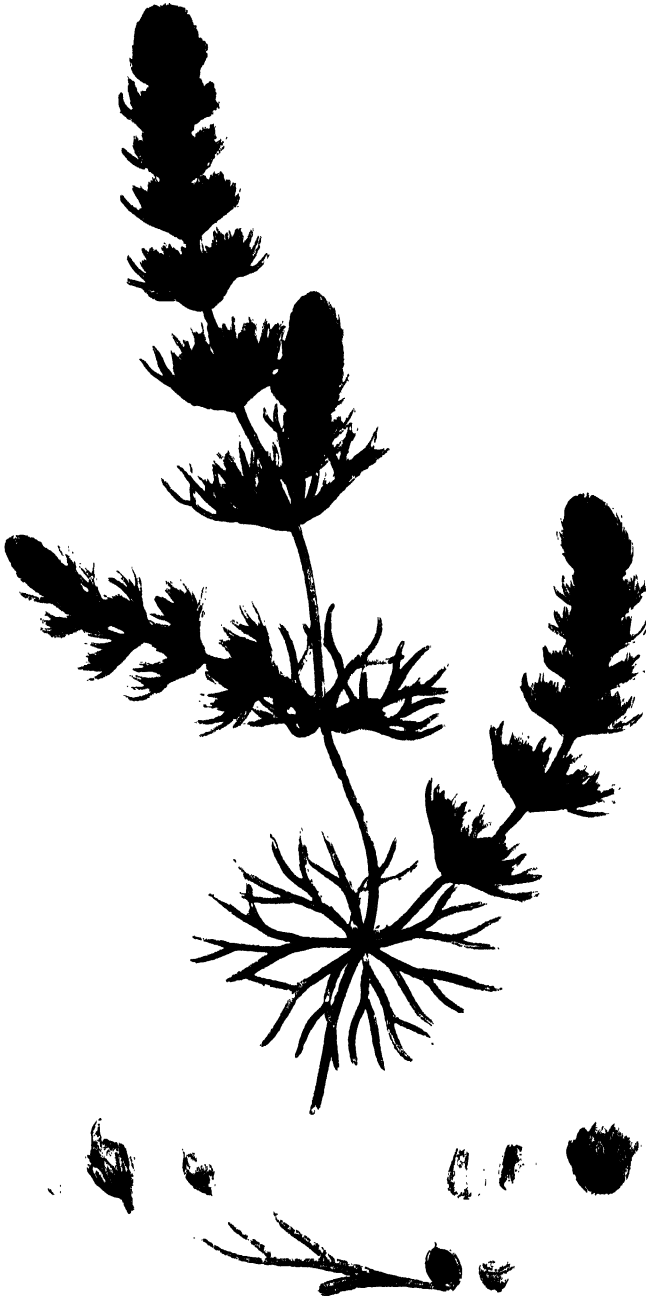
E. B. S. 2732.

Callitriche autumnalis. Autumnal Water Starwort.



E. B. 947.

Ceratophyllum demersum. Common Hornwort.



E. B. 679.

Ceratophyllum submersum. Unarmed Hornwort.



E. B. 879.

Parietaria diffusa. Pellitory-of-the-wall.



E. B. 1750.

Urtica dioica. Common Nettle.



E. B. 148.

Urtica pilulifera, var *genuina*.

Roman Nettle, var. *a*.



Urtica pilulifera, var. *Dodartii*.

Roman Nettle, var. β .



E. B.

Urtica urens. Small Nettle.







E. B. 427.

Humulus Lupulus. Common Hop.



.B. 1886.

Ulmus suberosa, var. *genuina*. Common Elm, var. *α*.



E. B. 2248.

Ulmus suberosa, var. *glabra*. Common Elm, var. γ .



E. B. 1887.

Ulmus montana. Broad-leaved Elm.



E. B. 1342.

Quercus pedunculata. Common Oak.



E. B. 1845

Quercus sessiliflora. Sessile-fruited Oak.



Castanea vulgaris.

Sweet Chestnut.



E. B. 1846.

Fagus sylvatica. Common Beech.

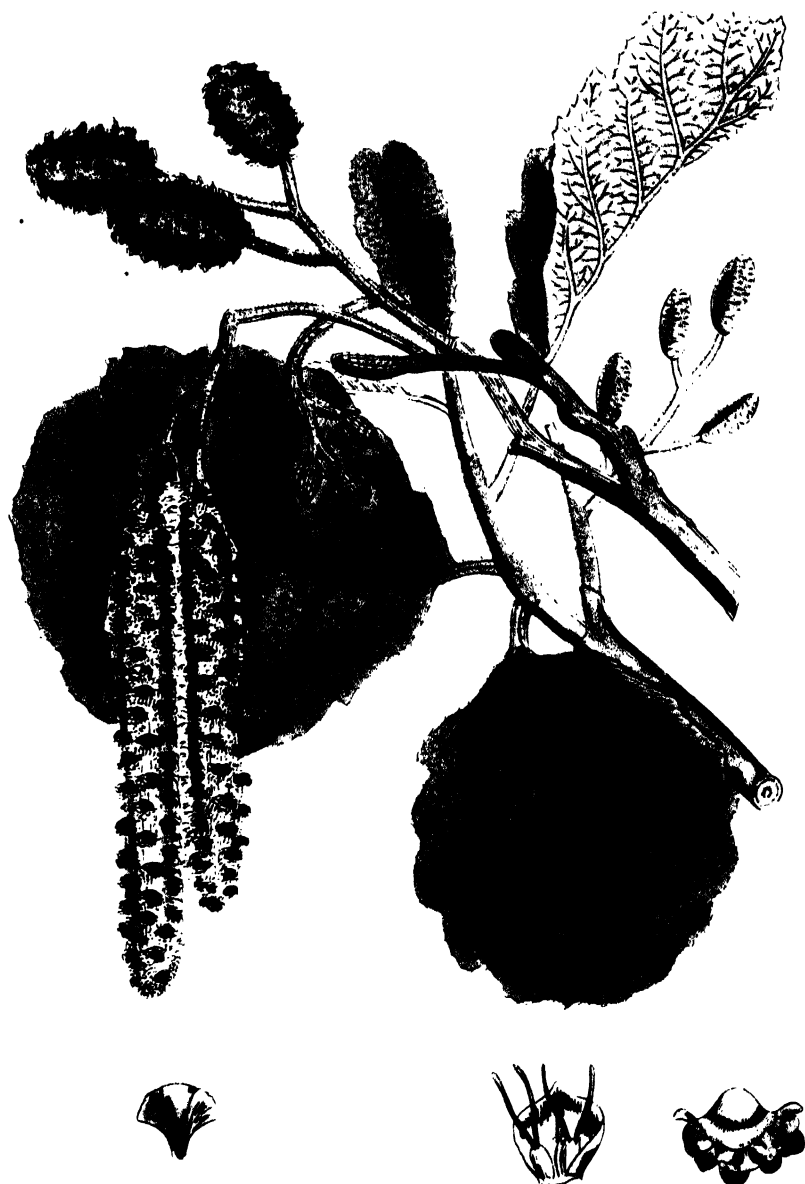


Corylus Avellana. Hazel.



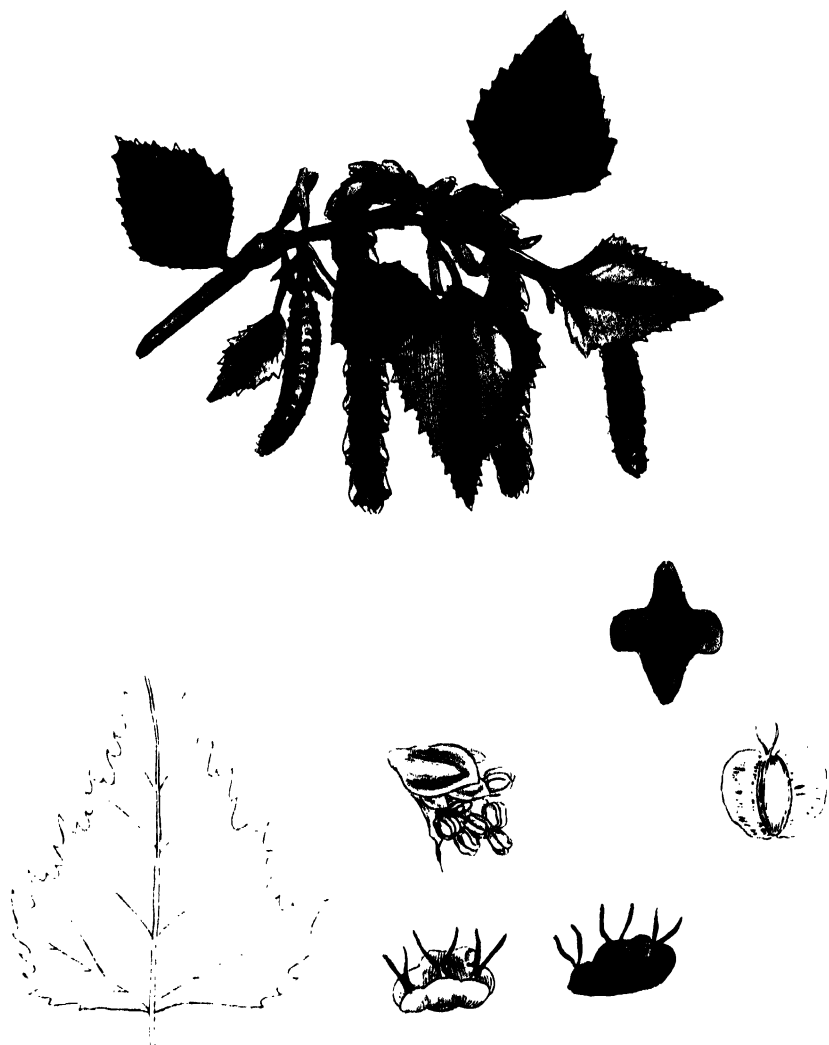
E. B. 2032.

Carpinus Betulus. Hornbeam.



E. B. 1508.

Alnus glutinosa. Common Alder.



E. B. 2198.

Betula verrucosa. White Birch.



E. B. 2198.

Betula glutinosa. Common Birch.



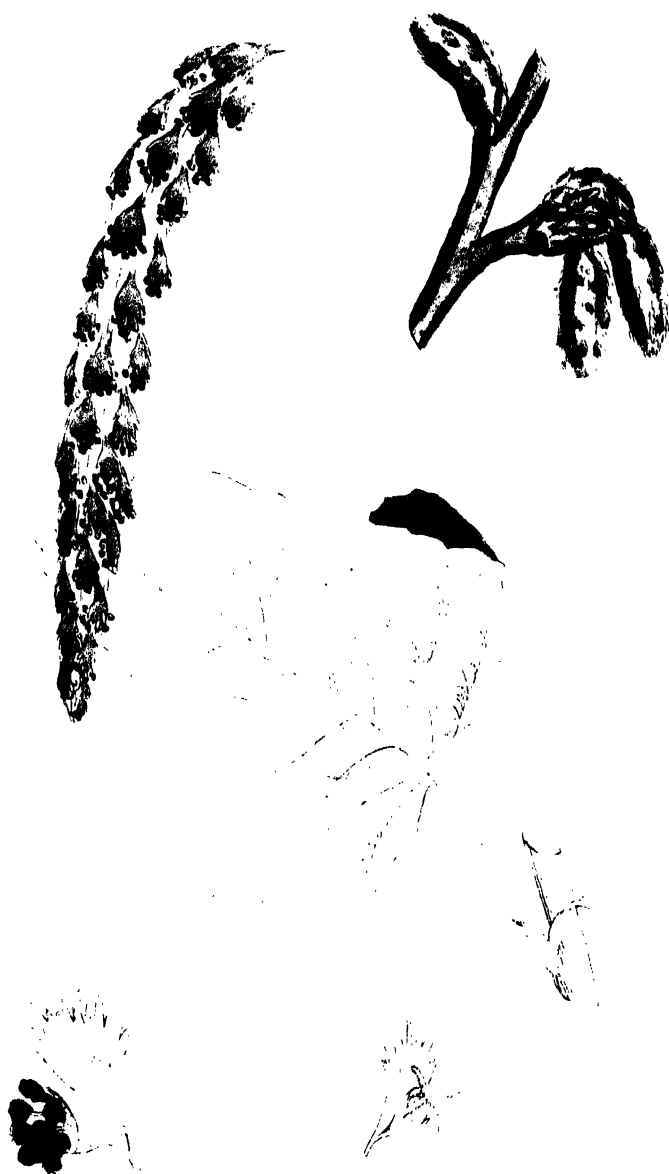
2326.

Betula nana. Dwarf Birch.



E. B. 562.

Myrica Gale. Bog-Myrtle.



E. B. 1618.

Populus eu-alba. White Poplar.



E. B. 1619.

Populus canescens. Gray Poplar.



E. B. 1909.

Populus tremula. Aspen.



E. B. 1910.

Populus nigra. Black Poplar.



E. B. 1805.

Salix pentandra. Bay-leaved Willow.



E. B. S. 2961.

Salix cuspidata, mas.

Pointed-leaved Willow, male.



E. B. S. 2962.

Salix cuspidata, fœmina. Pointed-leaved Willow, female.



E. B. 1807.

Salix fragilis, var. *genuina*. Crack Willow.



E. B. 1937.

Salix fragilis, var. *decipiens*.

White Welsh Willow.



E. B. 1808.

Salix viridis. Bedford Willow.



E. B. 2430.

Salix alba, var. *genuina*.

White Willow.



E.B. 2431.

Salix alba, var. *cœrulea*. Blue Willow.



E. B. 1389.

Salix alba, var. *vitellina*. Golden Willow.



E. B. 1436.

Salix undulata. Sharp-stipuled triandrous Willow.



E. B. 1435.

Salix triandra, var. *genuina*.

Almond-leaved Willow, var. *α*.



E. B. S. 2620.

Salix triandra, var. *Hoffmanniana*.

Almond-leaved Willow, var.



E. B. 1936.

Salix triandra, var. *amygdalina*.

Almond-leaved Willow, var. *γ*.



E.B. 1388.

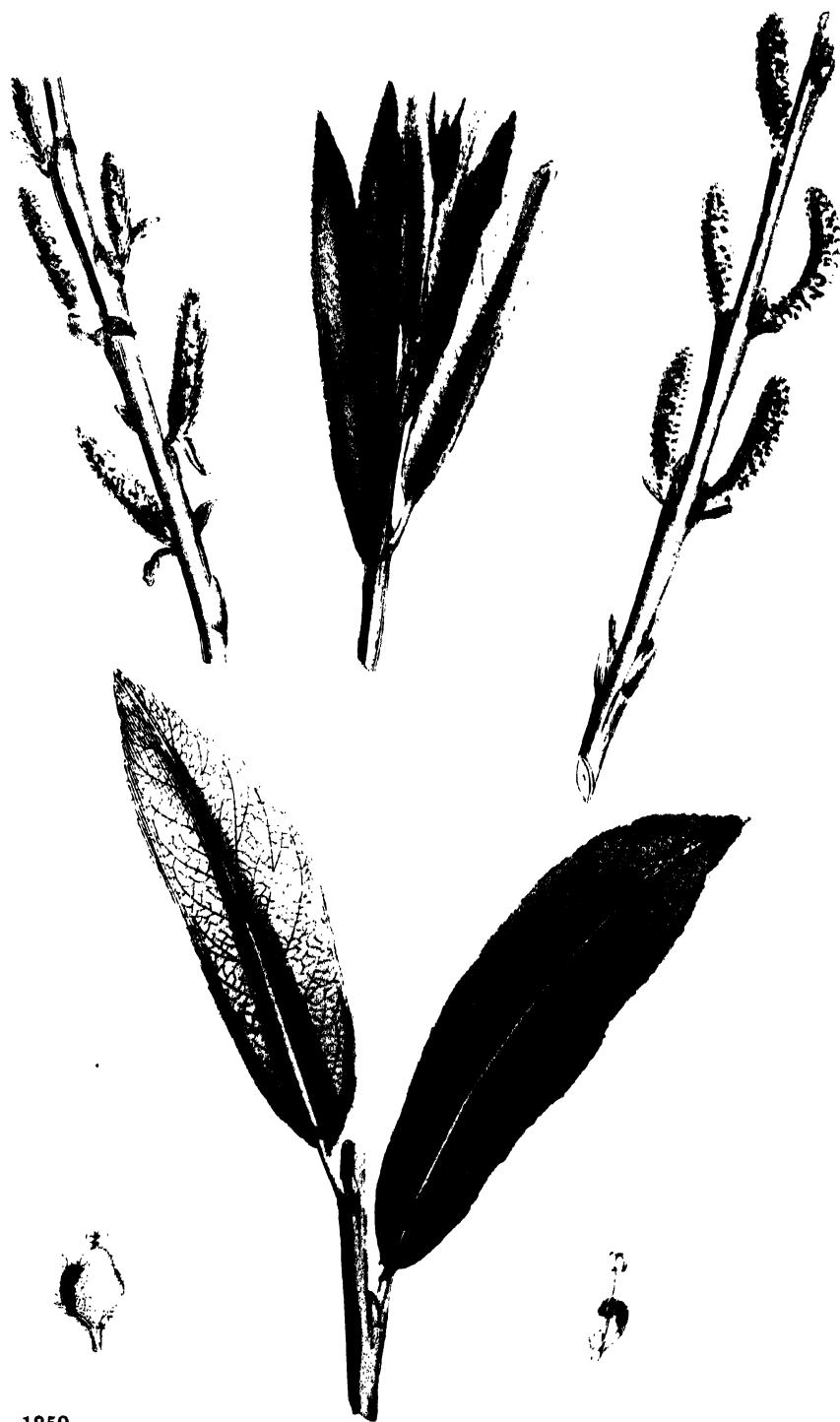
Salix purpurea, var. *genuina*. Purple Willow, var. *α*.



E. B. S. 2651.

Salix purpurea, var. *Woolgariana*.

Purple Willow, var. β .



E. B. 1359.

Salix purpurea, var. *Lambertiana* Boyton Willow.



1343.

Salix pupurea, var. *Helix*. Rose Willow.



E. B. 1145.

Salix rubra, var. *genuina*. Green-leaved Osier.



E. B. 1344.

Salix rubra, var. *Forbyana*. Fine-basket Osier



E. B. 1898.

Salix viminalis. Common Osier.



E. B. 1214.

Salix stipularis. Auricled Osier.



E. B. 1509.

Salix Smithiana, var. *genuina*.

Silky-leaved Osier, var. *a*.



E. B. S. 2665.

Salix Smithiana, var. *ferruginea*.

Silky leaved Osier, var. β .



E. B. 1434.

Salix acuminata

Long-leaved Sallow.



E. B. 1897.

Salix cinerea, var. *genuina*. Common Sallow, var. *a*.



E. B. 1497.

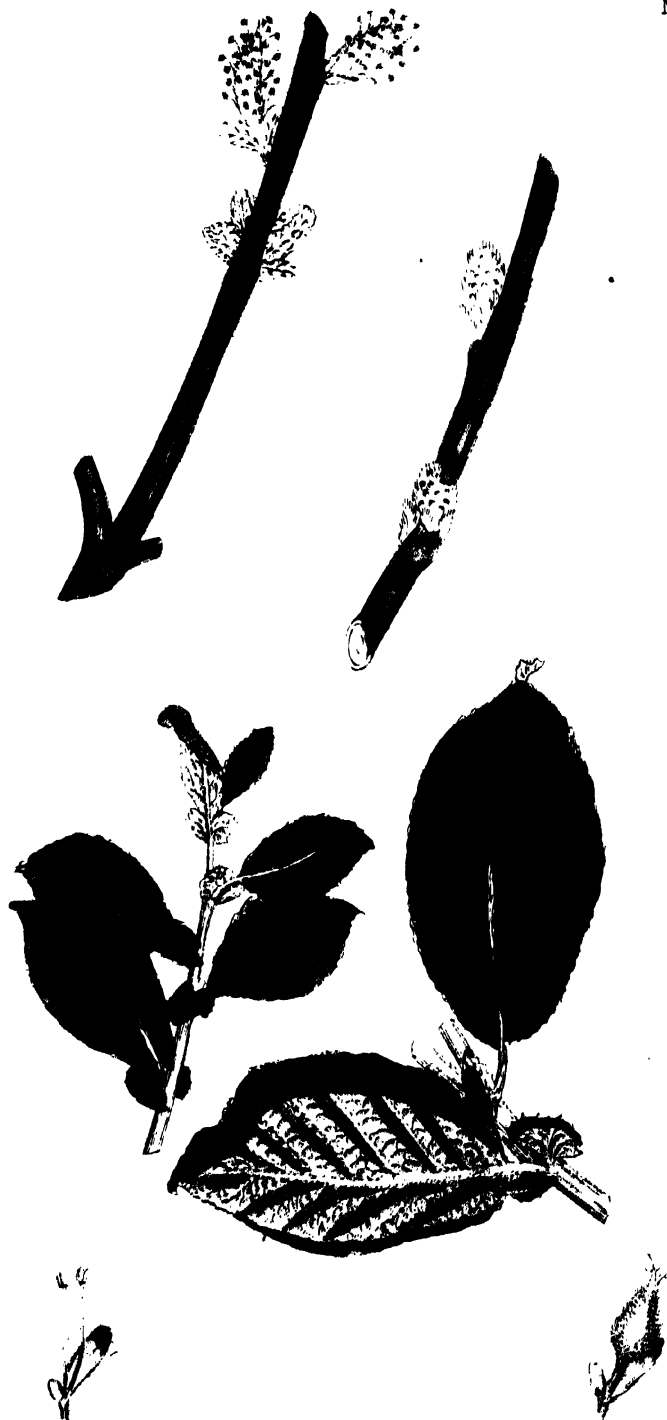
Salix cinerea, var. *aquatica*.

Common Sallow, var. β .



E. B. 1402.

Salix cinerea, var. *oleifolia*. Common Sallow, var. γ .



E. B. 1487.

Salix aurita. Wrinkled-leaved Sallow.



E.B. 1488.

Salix Caprea, var. genuina. Great Sallow, var. *g.*



E.B. 2333.

Salix Caprea, var. *sphacelata*.

Great Sallow, var. β .



E. B. 1806.

Salix laurina. Intermediate Sallow.



E. B. 1958.

Salix phylicifolia, var. *radicans*.

Tea-leaved Sallow, var. *a*.



E. B. S. 2701.

Salix phylicifolia. *Davalliana.* Tea-leaved Sallow, var. β .



E. B. 2656.

Salix phylicifolia, var. Weigeliiana.

Tea-leaved Sallow, var. γ .



E. B. S. 2655.

Salix phylicifolia, var. *nitens*. Tea-leaved Sallow, var.



E. B. 1146.

Salix phylicifolia, var. *Croweana*. Tea-leaved Sallow, var. *t.*



E. B. 1390.

Salix phylicifolia, var. *Dicksoniana*. Tea-leaved Sallow, var.



E. B. S. 2650.

Salix phylicifolia, var. *tenuior*. Tea-leaved Sallow, var.



E. B. S. 2749.

Salix phylicifolia, var. *laxiflora*. Tea-leaved Sallow. var. *θ*.



E. B. S. 2729.

Salix phylicifolia, var. *propinqua*. Tea leaved Sallow, var.



E. B. S. 2702.

Salix phylicifolia, var. *tetrapla*. Tea-leaved Sallow, var. *κ*.



E. B. S. 2619.

Salix phylicifolia, var. *Borreriana*. Tea-leaved Sallow, var. *λ*.



E. B. S. 2660.

Salix phylicifolia, var. *phillyreifolia*. Tea-leaved Sallow, var.



E. B. S. 2795.

Salix phylicifolia, var. *tenuifolia*. Tea-leaved Sallow, var. *v.*



Salix nigricans, var. *genuina*.

Dark-leaved Sallow, var. *a*



E. B. 1403.

Salix nigricans, var. *cotinifolia*. Dark-leaved Sallow, var. β .



E. B. 2344.

Salix nigricans, var. *Forsteriana*. Dark-leaved Sallow, var. *γ*.



E. B. 2342.

Salix nigricans, var. *rupestris*.

Dark-leaved Sallow, var.



E. B. 2343.

Salix nigricans, var. *Andersoniana*.

Dark-leaved Sallow, var. *ε*.



E. B. 2709.

Salix nigricans, var. *damascena*. Dark-leaved Sallow, var. ζ .



E. B. S. 2725.

Salix nigricans, var. *petraea*.

Dark-leaved Sallow, var. *η*.



E.B. 1404.

Salix nigricans, var. *hirta*.

Dark-leaved Sallow, var. *θ*.



E. B. 2186.

Salix nigricans, var. *floribunda*.

Dark-leaved Sallow, var. *l*.



E. B. S. 2733

Salix ambigua.

Ambiguous Sallow



E. B. 183.

Salix repens, var. *genuina*. Dwarf Willow, var. *a*.



E. B. 1960.

Salix repens, var. *fusca*.

Dwarf Willow, var. β .



E. B. 1959.

Salix repens, var. *prostrata*. Dwarf Willow, var. γ .



E. B. 1962.

Salix repens, var. *ascendens*.

Dwarf Willow, var. ♂.



E. B. 1961.

Salix repens, var. *parvifolia*.

Dwarf Willow, var. s.



E. B. S. 2600.

Salix repens, var. *incubacea*. Dwarf Willow, var.



E. B. 1364.

Salix repens, var. *argentea*.

Dwarf Willow, var. η .



E. B. 1365.

Salix rosmarinifolia, var. *genuina*. Rosemary-leaved Willow, var.



E. B. S. 1366.

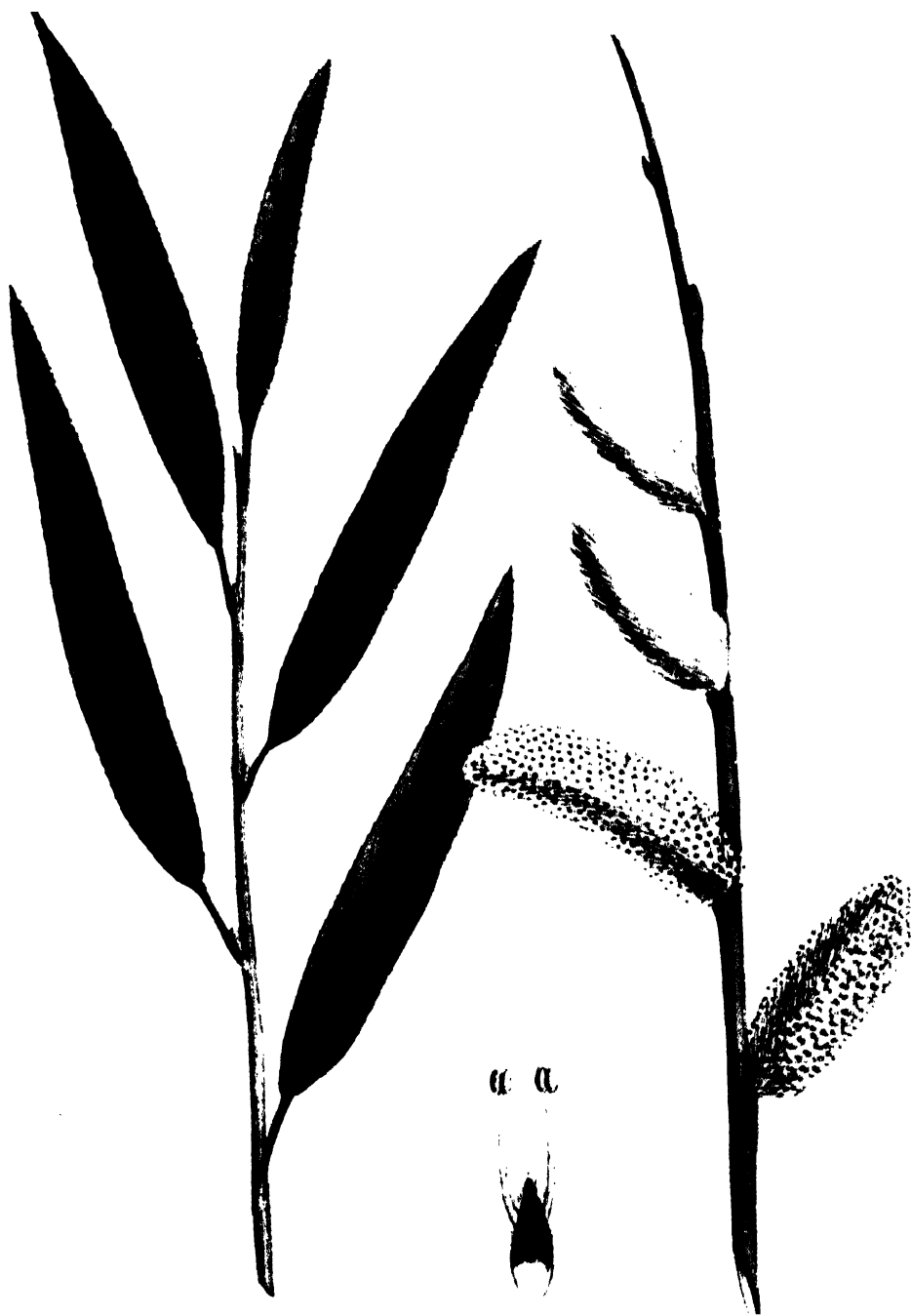
Salix rosmarinifolia, var. *argentifolia*.

Rosemary-leaved Willow, var. β .



E. B. S. 2599.

Salix Doniana. Donian Willow.



Salix acutifolia.

Violet Willow.



E. B. S. 2624.

Salix lanata. Woolly broad-leaved Willow.



B. 1809.

Salix Lapponum, var. *arenaria*. Downy mountain Willow, var. .



E. B. 2586.

Salix Lapponum, var. *Stuartiana*.

Downy mountain Willow, var. β .



E. B. 1810.

Salix Lapponum, var. *pseudo-glauca*.

Downy mountain Willow, var. γ .



E. B. 1363.

Salix arbuscula, var. *carinata*.

Plum-leaved Willow, var.



E. B. 1361.

Salix arbuscula, var. *prunifolia*. Plum-leaved Willow, var.



E. B. 1362.

Salix arbuscula, var. *venulosa*.

Plum-leaved Willow, var. γ .



E. B. 2341.

Salix arbuscula, var. *vacciniifolia*.

Plum-leaved Willow, var. ♂.



E. B. 1360.

Salix myrsinites, var. *serrata*.

Whortleberry-leaved Willow, var. *α*.



E. B. S. 2753.

Salix myrsinites, var. *procumbens*.

Whortleberry-leaved Willow, var.



Salix Grahami. Graham's Willow.



E. B. 1907.

Salix herbacea. Least Willow.



E. B. 1908.

Salix reticulata. Reticulate-leaved Willow.



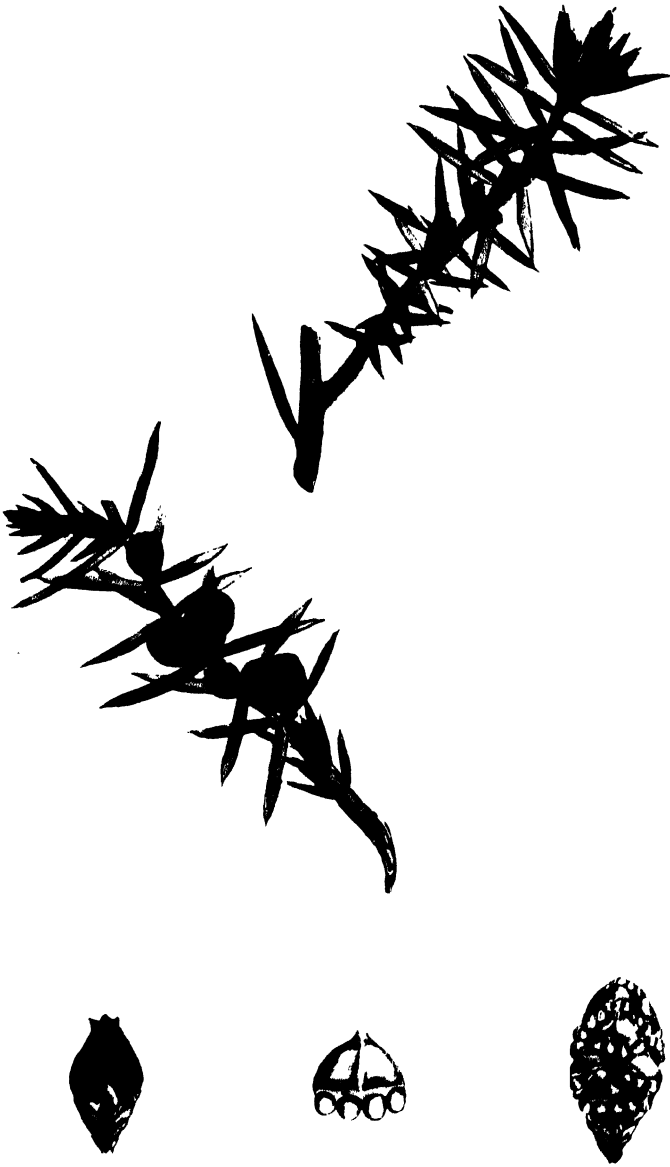
E. B. 2460.

Pinus sylvestris. Scotch Fir.





Pinus Pinaster. Cluster Pine.



E. B. 1100.

Juniperus eu-communis. Common Juniper.



E. B. S. 2743.

Juniperus nana. Alpine



E. B. 746.

Taxus baccata. Common Yew.

December, 1885.

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